AUGUST • 1948

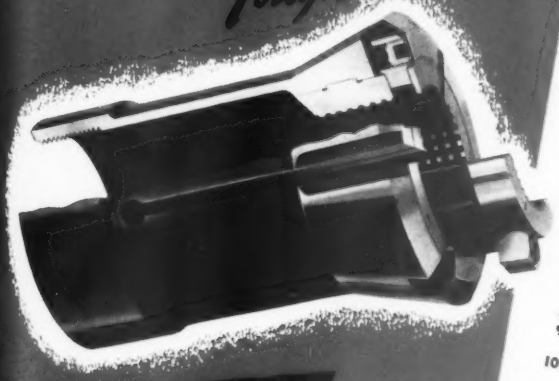
TOOL & DIE JOURNAL

TOOLING and PRODUCTION

You'll do MORE...You'll do BETTER with

BALAS CAM-GROUND COLLETS

"Tough and True Running"



10 WAYS IN WHICH YOU MAKE AMAZING SAVINGS IN TIME AND MONEY WITH MARTIN MASTER COLLETS

1. It reduces Set Up Time.
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7. Pads obtainable for any shape bar stock.
8. No special tools required.
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10. Absolutely guaranteed.

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Whether your machines are performing on the "long runs" as you expect, may depend on the collets you are using. Balas Collets insure better production because they are "cam-ground"—they run true, they grip tighter and they work faster. Balas Collets have many exclusive features, yet you pay no more for them than for ordinary collets. Get the facts on all types of Balas Collets and how they fit your production needs. Send coupon for free catalog today!

also

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Bellows
"Controlled-Air-Power"
COLLET CHUCK

THIS new Bellows air-operated Collet Chuck accommodates collets with a stock clearance up to 1⅜", with a variation in work pieces up to .020", and will permit passing stock up to maximum capacity through the collet. Uses standard collets. Can be mounted in any position.

Gripping power at 60 pounds air pressure equals approximately 185 foot pounds torque. Among many unique features is a "dead man" safety holding stock securely if air pressure is cut off.

Write for Bulletin BZC-50E

The Bellows Co.
AKRON 9, OHIO

932

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TOOL & DIE JOURNAL

TOOLING AND PRODUCTION

1975 LEE ROAD
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CBJ SELECTED CIRCULATION

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NEXT MONTH

"Die Design for Symmetrical Brackets", Part I, by Hans Effgen, M.E., Globe Tool & Gage Works, Boston, Mass. Mr. Effgen's working descriptions of multi-station dies are well known to TDJ readers. His next feature, originally announced as a single article, has been expanded to a series of three and will include types and construction of dies for brackets with bends in two directions.

•

"Butt-Welding Spiral Blades" by Alexander Maxwell. A short know-how and show-how feature covering the silver soldering of spiral blades by means of a butt-welder, or with any low voltage, high amperage current source. This technique offers a toolroom economy.

•

"Why Hydraulic Presses?", Part III. This concludes Herbert Chase's informative series on the hydraulic press, its functions and capabilities.

•

"All-Depth" Drills for Shallow and Deep Hole Drilling", Part II. Mr. Lucht, of the Carboloy Company, concludes this feature by covering cutting fluids, feeds, and speeds, and machines for performing "gun-drilling" operations; as well as rotary drills vs stationary drills, steady-rests and chip disposal.

•

"New Developments in Tool Steels", Part III, by George A. Roberts, Chief Metallurgist, Vanadium-Alloys Steel Company. Hot work and cold work die steels and their physical characteristics and heat treatment are comprehensively covered by text and charts for tempering time, tempering temperatures, stress, deflection, and hardness. Mr. Roberts' pages will be filed with many a toolmaker's shop notes.

•

New Products
Production Machines, Tools and Accessories. Toolroom Equipment. Measuring Tools and Gages.

New Literature
Catalogs, Pamphlets, Data.

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Completely Cold Forged
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DOWEL PINS by HOLO-KROME
RUST RESISTANT • BLACK LUSTRE FINISH
Acts as a lubricant, retards corrosion, prevents rusting. H-K Dowel Pins, made from H-K Special Analysis Alloy Steel, are hardened, carburized, double precision ground. Every dowel pin 100% individually inspected. Available from Stock.
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WE'VE HELD AN AUTOPSY

on every tool, die and special machine we've built in the past thirty years.

HERE'S WHAT IT MEANS to you!

We've learned a lot of "do's" and "don'ts" through these autopsies . . . for thirty years, we've literally gone over every completed job with a fine-tooth comb to see where it could have been done better or at less cost . . .

We've accomplished the feat of making a job that "looks good on paper", prove equally good and often better on the production line . . . we no longer "guesstimate" when figuring costs, the customer gets what he pays for and we get paid for what the customer gets, no more and no less . . . we come close to the "bull's-eye" in estimating production, maintenance and tool life . . .

We've tried, and succeeded, in providing our customers with tools, dies and special machinery that proved to be of real satisfaction to them . . . a real investment in long life, in high production, in precision, scrap-free operation, in high man-hour output, and in all around lower ultimate costs; and, where necessary, we've learned how to cut corners to meet thrifty budgets.

For outstanding dependability in prices, promises, production and performance of tools, dies and special machinery, you'll find it an investment to do business with Barth. Write for Barth's latest catalogue.

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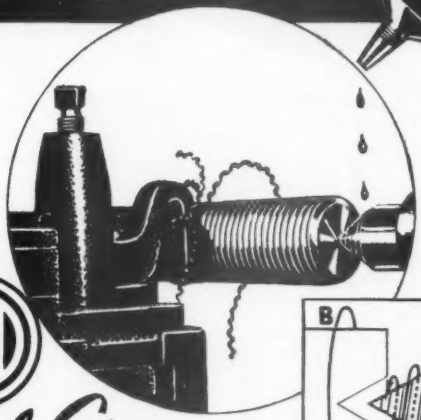
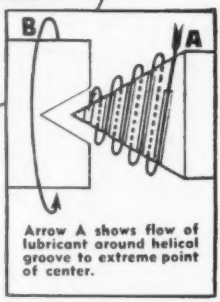
Lubricate Centers
Without Stopping Machines



Use CMD *Helical Groove*
CENTERS



Arrow A shows flow of lubricant around helical groove to extreme point of center.

Their *exclusive* helical groove conveys the oil to the extreme point of the center, where it covers the entire bearing surface. The groove holds a reserve supply of oil that flows constantly into the extreme point of the center. *Greater machine output* is only one of many advantages of CMD Helical Groove Centers. Send coupon for full details!

Write for FREE Sample Kit!

CHICAGO MANUFACTURING & DISTRIBUTING CO.
Dept. 188, 1928 West 46th St., Chicago 9, Ill.

☐ Send circular on CMD Helical Groove Centers.

☐ Without obligation to us, send FREE sample kit containing a tube of CMD CENTER POINT OIL and a tube of CMD CENTER POINT LUBE (grease) with directions for making an amazing, simple test.

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GET THE FACTS ON

Ex-Cell-O is a pioneer in the manufacture of drill jig bushings to close hole limits. Naturally, these closer limits make possible longer tool life and greater accuracy. **Ex-Cell-O, noted as headquarters for precision-made bushings, carries one of the largest and most varied stocks of drill jig bushings available in the world. A.S.A. Standard bushings can be obtained directly from Ex-Cell-O's Detroit and New York offices and from the Machinery Sales Company in Los Angeles. Send for Ex-Cell-O Catalog No. 11882, giving standard bushing sizes.**

XLO
EX-CELL-O for PRECISION

48—40

EX-CELL-O CORPORATION

DETROIT 32 · MICHIGAN

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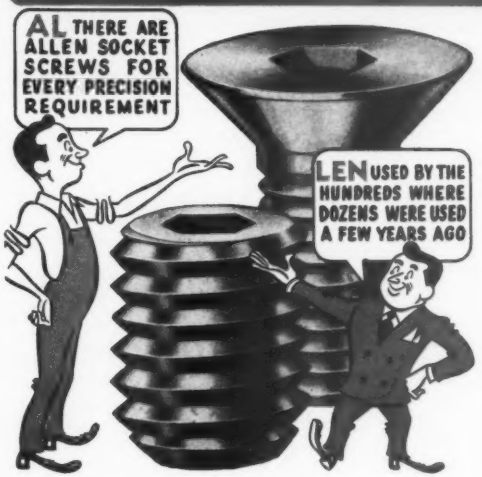
IF YOUR WORK INVOLVES ONE OF THESE FASTENING PROBLEMS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Look to ALLEN HEAD SCREWS for the answer . . .

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Allen-TYPE screws aren't necessarily Allen-MADE. Be sure to get genuine ALLENS. SOLD ONLY THROUGH LEADING DISTRIBUTORS

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Where socket heads are not required for safety and convenience, Allen offers a high quality, super-strength square head screw in a broad range of standard sizes.

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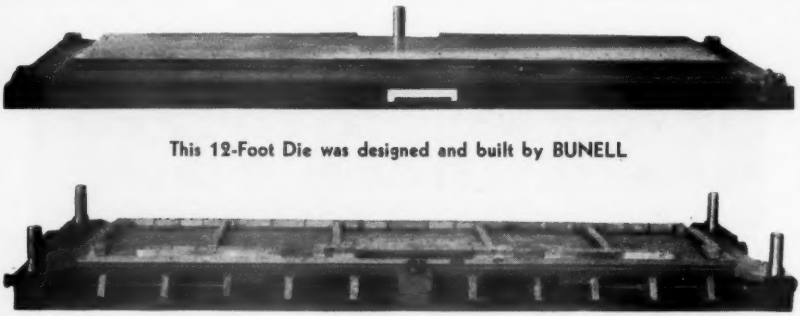

This 12-Foot Die was designed and built by BUNELL

when you need Dies, Jigs and Fixtures *larger than the average tool and die shop can handle . . .*

Check with Bunell

Bunell has plant capacity to handle your requirements—40,000 square feet of factory floor space —175 machines—adequate manpower in engineers, machinists and die makers.

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Will draw any shape

FIRTHALOY SHAPE DIES
Made with either solid or sectional nibs for drawing standard and special shapes of ferrous and non-ferrous wire, rods and tubes.

EASILY, FAST, ECONOMICALLY

- Recognized high quality of Firthaloy carbide grades assures greater wear resistance—longer life.
- Correct designing and a complete line of grades provide "tailor-made" dies to fit your exacting requirements.
- High standard of workmanship insures accurately made and better finished products.

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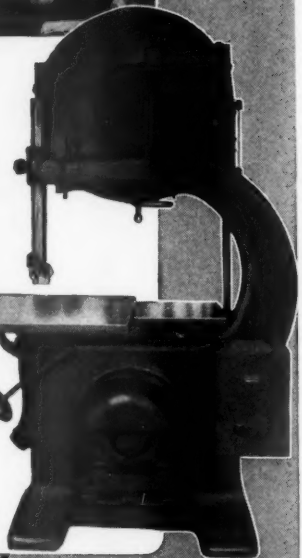
The SUPER METHOD

of TRIMMING FORMED PARTS

and performing a host of other metal cutting jobs!

The negligible down-drag and the ability of Tannewitz High Speed Band Saws to cut sheet metal from 90° to near 0 or 135° at tremendous speed make these machines ideal for trimming. Cuts can be made with perfect safety without using a rest of any kind.

Friction sawing with Tannewitz High Speed Band Saws also results in perfectly amazing time savings in the cutting of flat sheets, soft or hardened steels, armor plate, plastics, glass and many other materials. Whatever your cutting problem, chances are it can be done better and faster with Tannewitz Band Saws. Investigate this "Super" method of cutting.



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FRICTION SAWING

with **Tannewitz**

HIGH SPEED BAND SAWS

THE TANNEWITZ WORKS GRAND RAPIDS 4, MICHIGAN

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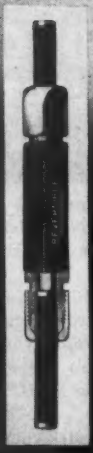
TO OBTAIN THE LONGEST WEARING GAGE

Request a NORBIDE Gage

then *DOUBLE* gage life again by making it *REVERSIBLE.*



NORBIDE plug gages, along with many other types of NORBIDE gages, have long been known to gage users for their exceptionally long-wearing qualities. NORBIDE gages are made of Norton Boron Carbide, which is the hardest material made by man. Gage life has often been increased up to one hundred times by the use of NORBIDE members in the gages.

Some gage suppliers are further doubling plug gage life by producing reversible gages. As one end of either the "go" or "no go" member becomes worn, it may be removed from the handle and reversed, with the unworn end thus being made available for further long gage life. Your regular gage supplier should be able to provide NORBIDE gages or, for further information, we invite your inquiries.

NORTON COMPANY, WORCESTER 6, MASS.

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"I want what I want — when I want it," is an old popular song that comes true when you call "Near Neighbor Service" for Producto Die-Sets... 26 telephone wires that answer "Yes" to your request for fast delivery.

Produced with the finest of precision machinery, from the best of materials, to exact tolerances and checked for the most minute detail... Producto Die-Sets give you everything you need.

This same service also applies to Producto Die Makers' Accessories... Dowel Pins, Die Springs, Stripper Bolts, Socket Head Cap and Set Screws, etc.

If you are a stranger to the Producto line, pick your nearest phone number from the listing above. You'll get intelligent interpretation of your needs, every time.

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Phone for "Near Neighbor" Service

JPD48

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Complete information on this newest Latrobe service . . .

Now Latrobe Electric Steel offers another far-reaching service . . . hardened, polished and etched Inspection Discs cut from bars in your own mill order for DESEGATIZED BRAND Steels.

What this new Latrobe service means to you as a user of tool or die steels is fully described in a timely new bulletin, which . . .

1—shows how these ready-prepared discs help improve production processes;

2—illustrates the photographic standards used for making inspection-disc comparisons;

3—lists the various steels to which this new Latrobe service applies.

It's a booklet you can't afford to be without . . . mail the coupon below.

Latrobe ELECTRIC STEEL COMPANY — Latrobe, Pa.

LATROBE
DESEGATIZED
BRAND OF DISPERSED-SEGREGATE
HIGH SPEED STEELS
TOOL & DIE STEELS

MAIL TODAY

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Gentlemen: Please send me, without obligation, your booklet on Inspection Disc Service.

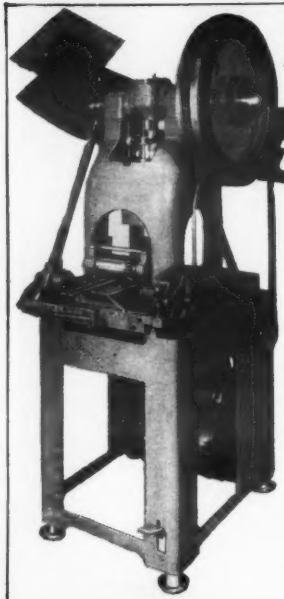
COMPANY_____

ADDRESS_____

ATTENTION OF_____ TITLE_____

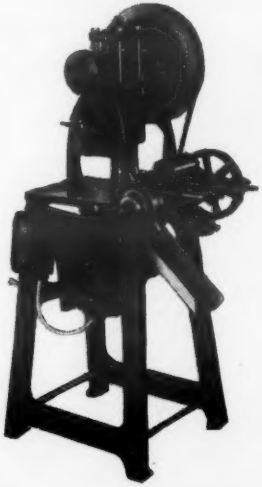
● Note—Latrobe DESEGATIZED BRAND Steels include High Speed Steels and High Carbon High Chromium Die Steels only.

DIEBEL HI-SPEED AUTOMATIC PRESSES



12 TON PRESS
65-300 STROKES
PER MINUTE

5 TON PRESS
180-550 STROKES
PER MINUTE



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INCREASED PRODUCTION
EFFICIENT PERFORMANCE
BUILT-IN AUTOMATIC FEED
ECONOMICAL TO OPERATE
LOW INITIAL COST

Twelve ton press equipped with single stroke operation clutch.

Presses are available with a double system of feeding with a set of rollers front and rear.

Diebel presses are employed with ferrous and nonferrous metals, fiber, plastics, rubber, and paper.

Complete details will be provided promptly on request.

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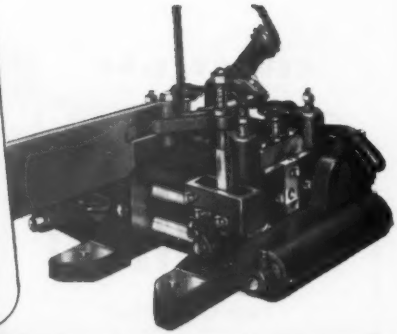
Assures Fast
Safe-Accurate
Feeding of
Coiled Strip Stock



WITTEK *Automatic*
ROLL FEEDS AND REEL STANDS

For All Types of Punch Presses

Wittek *Automatic* Roll Feeds provide maximum efficiency in the high speed automatic feeding of all types of coiled strip stock to punch presses. Highly flexible in function and application, they are capable of feeding lengths up to 24" per stroke of the press and will handle various stock thicknesses in widths up to the maximum width of the rollers.

Wittek *Adjustable* Reel Stands provide automatically expanding coil holders that center the coil and assure maximum production by eliminating looping, tangling and back lash of stock. If your production problem involves feeding coiled stock to punch presses, consult us. Your inquiry will be given immediate attention. Ask for completely descriptive catalog.

Automatic
ROLL FEEDS
and
REEL STANDS

WITTEK Manufacturing Co.
4305 W. 24th Place, Chicago 23, Illinois

NEW, TYPE-DX

HEAVY DUTY

Shoplifter

Two Capacities

2000 lbs. and 1000 lbs.

A larger, huskier version of the popular Type D 500 lb. Shoplifter, but retaining the easy handling features of the smaller lifter. Platform and base frame have an overall width of 24" that allows easy passage in narrow aisles, between presses, and through doorways. Hoisting unit is ball bearing equipped. Automatic friction-disc brake holds load at any point, not necessary to set or release pawl or brake device. Only 20 lbs. pressure is required on crank handle to raise or lower load. Extra heavy construction gives rigid stability that enables the operator to handle maximum loads with ease and smoothness. No other lifter of equal capacity on the market can match the Shoplifter for value. One user said: "It's a lot of machine for the money."

SPECIFICATIONS

CAPACITY—1000 lbs. and 2000 lbs.
OVERALL HEIGHT (to clear)—6'8".
PLATFORM LIFT—54".
PLATFORM PLATE—24" wide x 27½" long (30" out from uprights).
BASEFRAME—24" wide x 50½" long overall. Open end front.
BASE WHEELS—5" fixed wheels, 6" swivel casters with push bar steer.
HOIST UNIT (two capacities)—Ball bearing equipped, crank up and down action, automatic safety brake holds load at whatever point raised. Drum scored for cable.
PAINTED—Standard olive green finish.
PRICE—1000 lb. capacity.....$320.00
2000 lb. capacity.....$370.00
f.o.b. Chicago, freight prepaid to any destination in U.S.
Heavy duty foot operated floor lock.....$15.00 Extra

Shoplifter Type D Capacity 500 lbs. Price $157.50

ECONOMY ENGINEERING CO.

2659 West Van Buren Street, Chicago 12, Illinois

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Have You All The Information You Need?

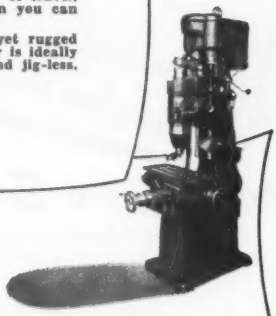
TWO TOOLROOM MUSTS

Spots . . . Drills . . . Bores or Reams All Holes In a Workpiece With Minimum Tool Changes

With the Moore Jig Borer, there's less stop-and-start to change tools at individual holes for each operation, because no size blocks or end measures are necessary. *Built-in* lead screws, accurate to .0002" over 14" of travel, enable you to make table settings faster than you can change tools.*

Highly sensitive for holes 1/32" diameter, yet rugged for heavy cuts up to 4½", the Moore Jig Borer is ideally suited for jigs, fixtures, dies, machine parts and jig-less, small lot production.

MOORE JIG BORER



Mechanically Relocates and Finish-Grinds Holes in Hardened Parts to .0001" in ⅓ The Time of Other Methods

The Moore Jig Grinder eliminates hours of checking on the bench and surface plate to correct holes in hardened parts. No toolmaker's buttons or locating plugs are necessary, for this unique machine through the use of *built-in* lead screws *mechanically* relocates and finish-grinds straight or tapered holes in ⅓ to ¼ the time required by conventional methods.*

Working to figures instead of to "fit", the Moore Jig Grinder puts die making on an interchangeable parts and assembly basis for the first time. Die, stripper and punch plates can now be produced concurrently with better alignment of mating parts and more uniform clearance between punch and die.

MOORE JIG GRINDER

*Write today for descriptive literature

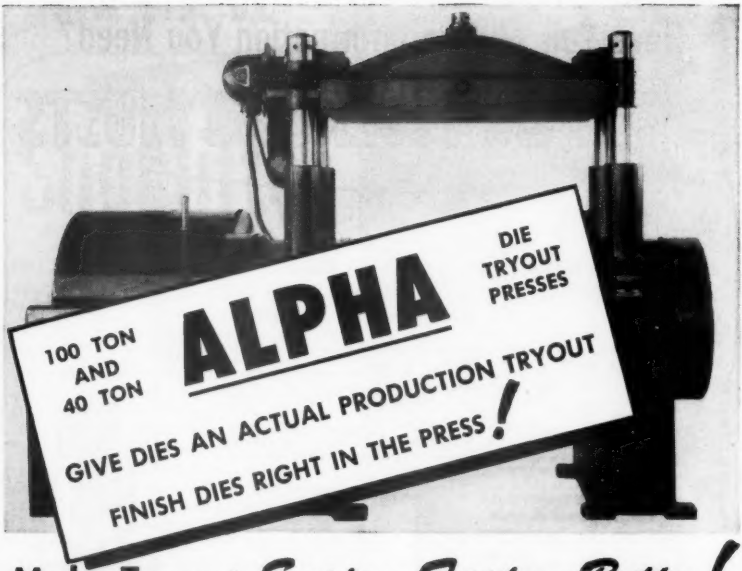
HAVE YOU BOUGHT YOUR COPY OF "PRECISION HOLE LOCATION"?

Over 5,000 copies of this valuable book on toolmaking practices have been sold to date. Available at special price of $3 in U. S. A.; $3.50 outside U. S. A.—448 pages, over 400 illustrations, 184 pages of Woodworth Coordinate Location Tables from 2 to 100 holes. Send check or money order to Moore Special Tool Co., Inc., Bridgeport 7, Conn.

MOORE TOOLS

MOORE SPECIAL TOOL COMPANY, INC.

726 UNION AVENUE • BRIDGEPORT 7, CONNECTICUT

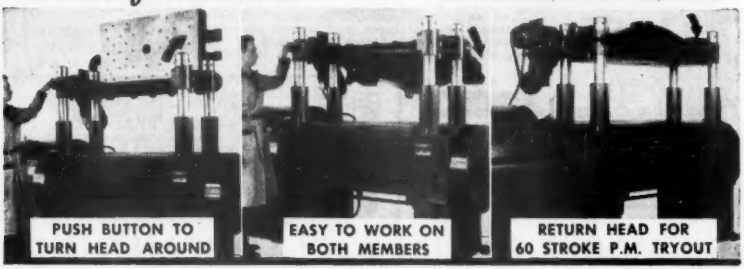


Make Try-out *Easier-Faster-Better!*

Alpha has revolutionized die tryout procedure. Now finishing work is done right in the press—without handling by making both members as readily accessible as though they were on a bench. Alpha presses also give a real production tryout at 50 to 100 strokes per minute—bringing to light faults that can not be detected in ordinary tryout presses.

Write for Details

ALPHA TOOL WORKS
9281 FREELAND, DETROIT 28, MICH.



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IF YOU'RE FROM MISSOURI *Step Right Up!*

WE'LL SHOW YOU

MEYCO
Carbide-Tipped
PLASTIC CUTTING CIRCULAR SAWS

● Here is the result of over a year's experience in building saws to special order for customers with unusually tough cutting problems. This is no ordinary saw tipped with carbide. The blade, the teeth, the set have all been engineered for tungsten carbide—the hardest satisfactory cutting material next to diamonds.

Here is a saw that will cut plastics—and keep on cutting for an unbelievably long time. Carbide's resistance to abrasion, coupled with engineering know-how in manufacturing fine cutting tools for well over half a century, produced a circular cutting saw that will cut costs as well as plastics. Here is long life with a minimum of sharpening . . . filing eliminated altogether . . . a time and cost-saving circular saw that merits your investigation.

"More than 80,000 feet of plastic sheets have been cut and it looks good for as much again."

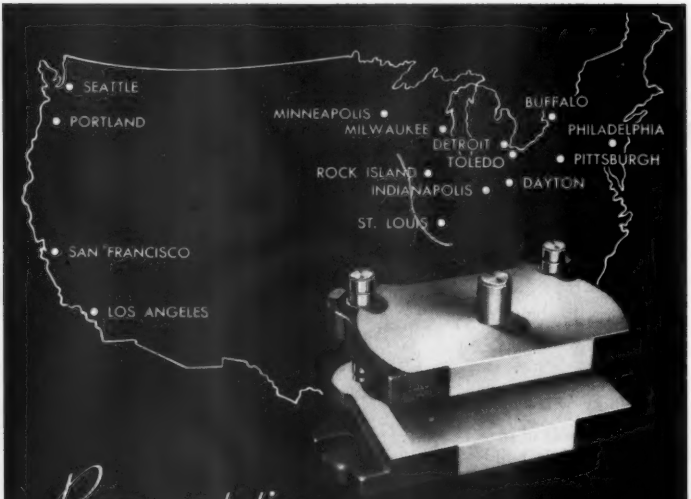
"This saw has parted 170,000 paper coils. The steel saws part approximately 6,000 per grind."

Write for Descriptive Catalog and Prices

60 YEARS OF FINE CUTTING TOOLS

W. F. MEYERS CO., INC., BEDFORD, INDIANA

SEE ADVERTISERS INDEX, PAGE 67, FOR KEY NUMBERS



Representation

throughout Industrial America

Micro-metric jig-bored die sets in commercial or precision grades are available to you through the DETROIT DIE SET representative in your community. Phone or write for prompt delivery of standard and special die sets and high-precision die maker's supplies.

CALL "DETROIT"

DETROIT	TR 2-5150
BUFFALO	PA 9206
DAYTON	HE 3042
INDIANAPOLIS	HU 5604
LOS ANGELES	AD 7251
MILWAUKEE	ED 2359
MINNEAPOLIS	AT 5264
PHILADELPHIA	VI 4-4084
PITTSBURGH	GR 1362
PORTLAND, ORE.	AT 3697
ROCK ISLAND, ILL.	RI 743
ST. LOUIS	FR 6811
SAN FRANCISCO	EX 2-7018
SEATTLE	LA 7100
TOLEDO	GA 5706

DETROIT DIE SET CORPORATION

2895 W. GRAND BLVD. • DETROIT 2, MICHIGAN

DETROIT DIE SETS ★

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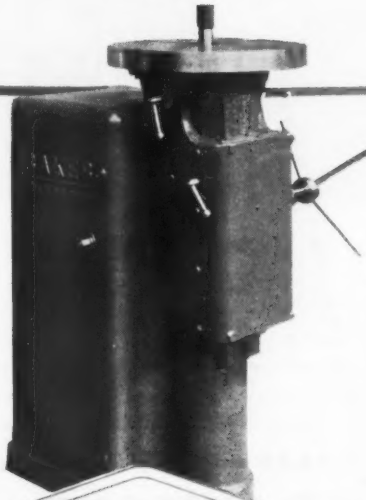
ACCURATE, COST-SAVING PERFORMANCE

on Work like this . . .

FLAT CAM

DIE

LEVER



Contour Grinding is *rapid, economical* and *accurate* . . . with this Baker Model No. 3 Grinder. Performs hand grinding which other types of grinders won't readily handle. Has vertical reciprocating movement of spindle—$\frac{3}{16}$". Diamond dresser is standard equipment and is quickly mounted.

Capacity, diameter of wheels—$\frac{1}{2}$" to 4". Capacity, face of wheels—2"-2$\frac{1}{2}$"-3". Diameter of table 18". Write for illustrated circular.

BAKER

MODEL 3 CONTOUR GRINDER

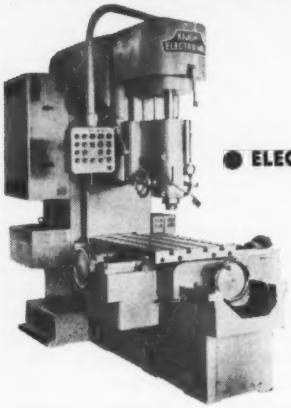
BAKER BROS., *Inc., Toledo, Ohio*

DRILLING, BORING, TAPPING and KEYSEATING MACHINES

SEE ADVERTISERS INDEX, PAGE 67, FOR KEY NUMBERS

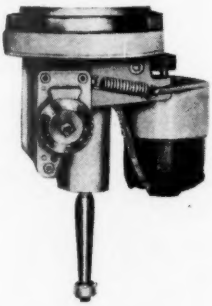
NEW! KNIGHT EQUIPMENT

. . to Boost Output and Lower Costs



● ELECTROMILL

Efficiently, economically handles large capacity work of many types: jigs, metal patterns, multi-cavity molds, jig boring with dial indicator, drilling, milling, machining light metals, etc. Infinitely variable range of speeds and feeds. Any combination of speeds and feed controls can be supplied or eliminated subject to customers requirements.



● HOLE GRINDING ATTACHMENT

Accurately and quickly finishes holes and bores up to 6" diameter in hardened parts. Simplifies handling work too large to swing in standard machines. Special adaptors permit easy installation on any milling machine.

Write Today for details and specifications

KNIGHT VERSATILE ACCURATE RIGID MILLERS

W. B. KNIGHT MACHINERY COMPANY

MORE GOODS for MORE PEOPLE at LOWER COST

3920 WEST PINE BLVD. • ST. LOUIS 8, MISSOURI

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

PRODUCING END MILLS

—despite this

On June 23 a mid-air collision of two Navy fighter planes over Detroit caused one to crash into the middle of the Putnam plant, killing the pilot, injuring two Putnam workers and causing considerable damage to the grinding department. Miraculously no workers were killed.

Putnam Tool Company is pleased to announce that this accident, one of the most unusual to befall an industrial plant, will not inconvenience Putnam customers. Fortunately, raw stocks and finished products were not seriously damaged. Emergency repairs put the plant back into production within 10 days after the crash.

Putnam still offers best delivery from the country's largest and most complete end mill selection!

PTC PUTNAM TOOL COMPANY

2985 CHARLEVOIX AVENUE · DETROIT 7, MICHIGAN

AUTOMATICALLY

Move Parts to the Press Ram

and Watch Your Production Figures *SOAR!*

That's just one advantage of the

NEW 25-TON *MULTIPRESS
with *Automatic* Hydraulic Index Table

- Index table is completely hydraulically operated and interlocked with the MULTIPRESS.
- Either 6 or 12 station indexing.
- Speed control for both index table and press ram.
- Accurate location of each indexing movement.
- Provision for "skipping" of non-tooled station on the index table, if desired.
- Large 33" diameter index table assures ample tooling space.
- Maximum safety of operation since operator works at front of index table.
- A variety of automatic feed devices may be used with the 25-ton MULTIPRESS to further increase production.
- Index table is driven by a Denison fluid motor, allowing continuous starting and stopping with no damage to the drive mechanism.

Write today for complete details on this newest addition to the Denison line of MULTIPRESSES. Denison test laboratory facilities are always ready to prove the adaptability of the MULTIPRESS to your job. No obligation, of course.

The DENISON Engineering Company
1197 Dublin Road • Columbus 16, Ohio

DENISON
EQUIPMENT for APPLIED
HydrOILics

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

South Bend 9" Precision Lathes

Quality-Built for Quality Work

FEATURES AND SPECIFICATIONS

9"x 3' South Bend Model A Bench Lathe

SWINGS—9¼" over bed and saddle wings

BED LENGTHS—3, 3½, 4 and 4½ foot

DISTANCE BETWEEN CENTERS—16 to 34 inches

SPINDLE SPEEDS—
Six—41 to 658 r. p. m.
Twelve—41 to 1270 r. p. m.
Sixteen—46 to 1176 r. p. m.

POWER LONGITUDINAL FEEDS—
Model A Lathes—48, .0015" to .0853"
Model B Lathes—26, .0021" to .0155"
Model C Lathes—14, .0021" to .0156"

POWER CROSS FEEDS—
Model A Lathes—48, .0004" to .0252"
Model B Lathes—23, .001" to .0046"

THREAD CUTTING RANGE—
Model A Lathe—48 pitches, 4 to 224 per inch
Models B and C Lathes—45 pitches, 4 to 160 per inch

MAXIMUM COLLET CAPACITY—½ inch

The quality that is built into South Bend 9" Precision Lathes enables them to produce quality work with efficiency under all conditions. Regardless of the type of machining—between-centers, collet, fixture, or chucking—close tolerances can be maintained and a maximum volume of fine work produced with a minimum of effort.

Write for Catalog 9-J which fully describes and illustrates all South Bend 9" Precision Lathes and attachments.

SPEED PRODUCTION WITH THESE ATTACHMENTS

COLLET ATTACHMENTS	HANDLEVER BED TURRET
TAPER ATTACHMENT	DOUBLE TOOL CROSS SLIDE
MILLING ATTACHMENT	SQUARE TURRET
ELECTRIC GRINDER	CENTER REST
CARRIAGE STOPS	FOLLOWER REST

BUILDING BETTER LATHES SINCE 1906

SOUTH BEND LATHE WORKS

432 EAST MADISON STREET • SOUTH BEND 22, INDIANA

SEE ADVERTISERS INDEX, PAGE 67, FOR KEY NUMBERS

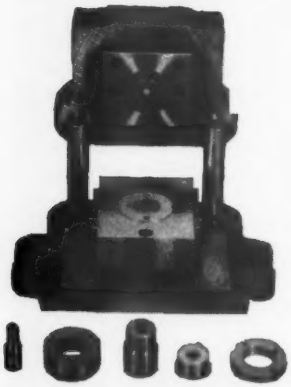
Only a few minutes' *Set-Up Time*

and you're ready to make a *NEW SIZE WASHER* when you use...

HOVIS

UNIVERSAL MASTER

WASHER DIES



Once having made a nominal investment in Hovis Master Washer Dies to fit your requirements, all you need is to change five small easily removable parts to make a new size washer. This takes only a few minutes. Think of what this means in the saving of time, materials, process engineering, tool designing and tool tryout! And you can make washers on short notice as you need them, avoiding large inventories. The Master Dies themselves do not become obsolete. USE THEM FOR PRESENT AND POSTWAR PRODUCTION. Write for illustrated folder.

← Made in 5 sizes:

$\frac{3}{4}$"—1$\frac{1}{2}$"—2$\frac{1}{2}$"—4"—6".

HOVIS SCREWLOCK COMPANY

8100 E. NINE MILE ROAD
Phone: Centerline 1575

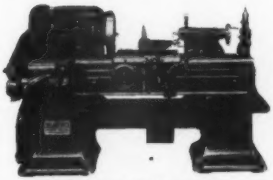
VAN DYKE, MICHIGAN
Suburb of Detroit

SPRINGFIELD

Geared Head
LATHES

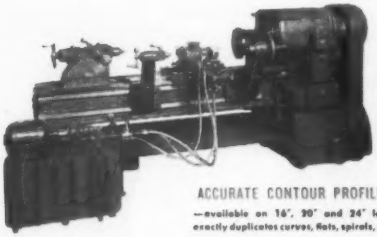
Springfield builds a complete line of precision, high quality, geared head lathes. Every type of lathe built by Springfield is especially designed and constructed to meet all the requirements of modern tooling, and to retain extreme accuracy through many years of full capacity production.

Write for catalogs and detailed specifications.



MANUFACTURING LATHE

—with unusually wide applications; capable of accurately turning, boring and facing.

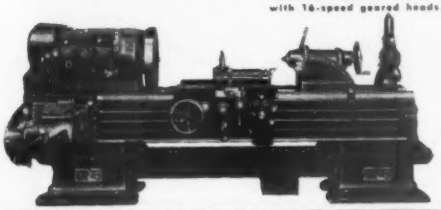


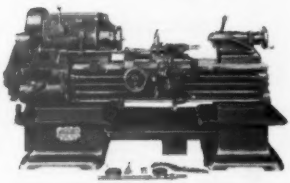
ACCURATE CONTOUR PROFILING

—available on 16", 20" and 24" lathes; exactly duplicates curves, flats, spirals, cams.

SUPER DUTY LATHES

—made in 20" and 22" sizes; equipped with 16-speed geared heads.





TOOL ROOM LATHES

—made in all sizes including 24"; equipped with lead screw reversing mechanisms.

THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD, OHIO, U. S. A.

GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 WEST MADISON ST., CHICAGO 6

Exclusive Representatives in All Principal Cities

SEE ADVERTISERS INDEX, PAGE 67, FOR KEY NUMBERS

GEMCO

MULTI-PURPOSE

SHAPERS *are the* LEADERS

★ *for* RUGGEDNESS

★ *for* PRECISION

★ *for* ADAPTABILITY

•

IN SIZES from 16" to 36" incl.

GEMCO Multi-Purpose Shapers provide simultaneously a ruggedness for deep hogging cuts, yet produce to close tolerances for all finishing cuts... an efficiency not often found in ONE Shaper.

3 MODELS... PLAIN PRODUCTION and UNIVERSAL

There's a GEMCO Shaper for every machine shop need... for average shop work (PLAIN); for heavy production work (PRODUCTION); for tool and die work, etc. (UNIVERSAL).

•

MFRS. OF PRECISION MACHINERY SINCE 1917

•

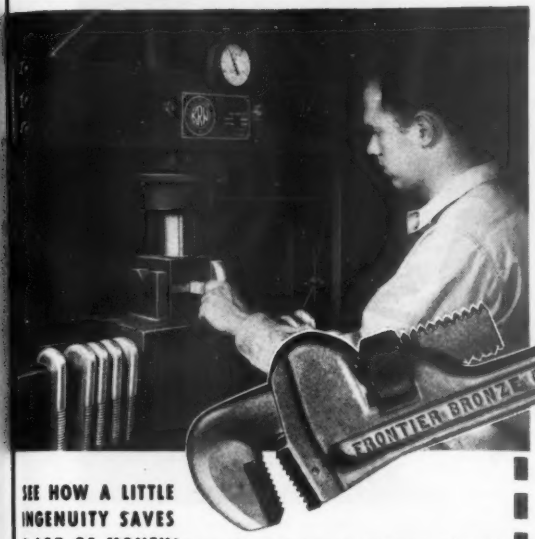
THE SHAPERS WITH THE EXCLUSIVE LUBRIGARD SAFETY DEVICE

★ *WRITE TODAY FOR BULLETIN GC-13D*

GENERAL ENGINEERING & MFG. CO.

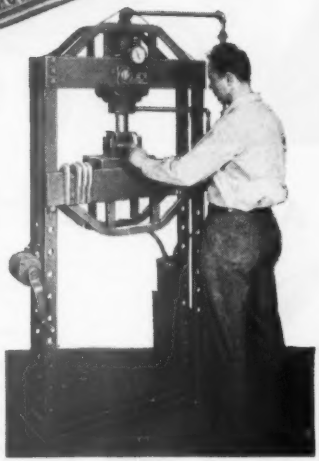
ST. LOUIS 16, MISSOURI, U. S. A.

"ARBOR PRESS" IN NAME ONLY!



FRONTIER BRONZE CORPORATION SPEEDS MANUFACTURE OF NEW ALUMINUM PIPE WRENCH WITH KRW MOTOR-DRIVEN ARBOR PRESS

SEE HOW A LITTLE INGENUITY SAVES A LOT OF MONEY! A special coining die used in this standard KRW 50-ton motor-driven arbor press removes burrs which result from normal manufacturing procedure. A simple operation which eliminates the need of costly grinding and assures a free-running, tight fitting, adjusting nut. *This new wrench weighs 60% less than conventional types yet withstands the same tests.*



THE CONVENTIONAL ARBOR PRESS has come a long way in the past few years. From such every day tasks as straightening and bending, it has grown into a full size production tool. Today — because of their low initial and operating cost — you'll find KRW Arbor Presses doing hundreds of manufacturing operations in all sorts of plants. A little ingenuity, combined with simple, inexpensive dies can save you money by releasing heavier, more expensive equipment for larger work.

KRW Hydraulic Arbor Presses are available in varying sizes and tonnages, either hand-operated, air-operated or motor-driven. Tell us your needs . . . we are fully equipped to advise and engineer presses to do your particular job. Deliveries on standard presses within 10 days.

NEW KRW 100-Ton Blanking, Forming, Stamping Press

Batteries of these New KRW Presses are now in use in many manufacturing plants doing all manner of work hitherto handled on presses whose installation costs are higher than the total cost of these revolutionary KRW Presses. Write for literature.

VERSATILE · ADAPTABLE · LOW COST!

● KRW Arbor Presses can be furnished for either vertical or horizontal ram travel. Distance between uprights can vary from 1 foot to 7 or better, daylight from inches to 6 feet and more. Even these specifications can be increased with minor changes and little cost. Investigate, use the coupon.

NAME YOUR NEEDS! MAIL COUPON TODAY!

K·R·WILSON

215 MAIN ST. · BUFFALO 3, N. Y.

18

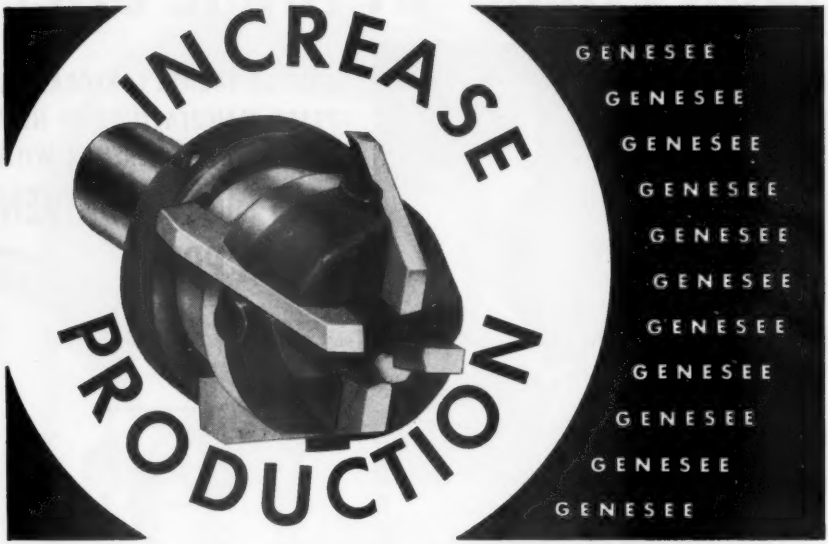
K. R. WILSON, 215 Main St., Buffalo 3, N. Y.

Please send me complete information on KRW Arbor Presses ☐
100-ton Hydraulic Presses ☐

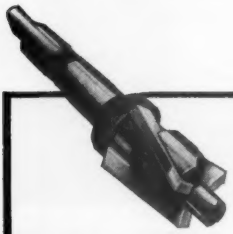
Name.....

Address.....

City and Zone..... State.....



ADJUSTABLE HOLLOW MILLS



Other Genesee tools that will increase production.

•

Inserted Blade FACING AND COUNTERBORING TOOLS

•

SPECIAL PRODUCTION TOOLS

There is a Genesee for every hollow milling job. Available in 16 styles. Standard sizes from 0 to 2", with straight or Morse taper shanks carried in stock . . .

- Each size tool has 1/8 range.
- Blades quickly ground in a simple fixture.
- All tools manufactured of heat-treated alloy steel.
- Adjusting threads are ground from the solid and adjusting rings are lapped for extreme accuracy.
- Furnished with high speed steel, cast-alloy, or Tungsten Carbide tipped blades.

Let our Engineering Department solve your Production Tool problems.

GENESEE MFG. CO., INC.
GENESEE
ROCHESTER 4, N.Y.

Write for catalog 45-J

ADJUSTABLE HOLLOW MILLS • FACING AND COUNTERBORING TOOLS • SPECIAL PRODUCTION TOOLS

PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

130 parts per minute from .062 stock

tolerance held within .002"

. . . using

DANLY PRECISION DIE SET

Six-stage progressive die produces 65,000 steel stampings per grind

In the stamping operation shown here, .062 cold rolled steel parts for electric shavers are pierced, swedged, sized, and blanked in an intricate six-stage progressive die. A Danly Precision Die Set, consisting of a semi-steel punch holder and all-steel die shoe, is used to take full advantage of the die maker's precision.

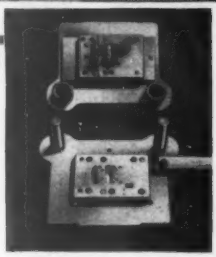
The six-stage die produces these parts at a rate of 130 per minute. Over-all tolerances are held within .002", and *an average of* 65,000 *parts are obtained between grinds.*

As a result of the close operating precision that is maintained, tumbling is the only secondary operation that is required to finish the piece.

Built to precision tolerances (guide posts and bushings ground to limits of two ten-thousandths of an inch) the operating accuracy of Danly *Precision* Die Sets insures close tolerances and long tool life.

Danly has a wide range of standard stock sizes available that can be quickly assembled and delivered to help you save time and money.

Danly engineering service—For helpful information on die sets of any size, standard or special, for any type of press operation, consult our engineering department. No obligation.



sequence of operation

Following is the sequence of operations performed as the C. R. Steel Strip is fed through the six-stage progressive die:

1st Step: Notch edge for feed stop.
2nd Step: Pierce pilot holes.
3rd Step: Pilot in outer holes. Pierce two holes.
4th Step: Swedge two holes.
5th Step: Pierce holes to size.
6th Step: Blank.

DANLY NATION-WIDE ★ASSEMBLY SERVICE

Danly offices in 10 key cities give immediate attention to your orders. Assembly plants (marked with stars) stock interchangeable parts for quick assembly and delivery of any standard die set to your specifications.

★ **Chicago 50,** 2100 S. 52nd Ave.
★ **Cleveland 14,** 1550 E. 33rd St.
★ **Dayton 2,** 990 E. Monument Ave.
★ **Detroit 16,** 1549 Temple Ave.
★ **Grand Rapids,** 113 Michigan Ave., N. W.
★ **Long Island City 1,** 47-28 37th St.
★ **Los Angeles 54,** Ducommun Metals & Supply Co., 4890 S. Alameda
★ **Milwaukee 2,** 111 E. Wisconsin Ave.
★ **Philadelphia 44,** 18 W. Chelten Ave.
★ **Rochester 4,** 16 Commercial St.

get this *free* bulletin

Illustrates how Danly's Special Machining and Welding Service can save you time and money for unusual die set applications.

DANLY

DANLY MACHINE SPECIALTIES, INC.
2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS

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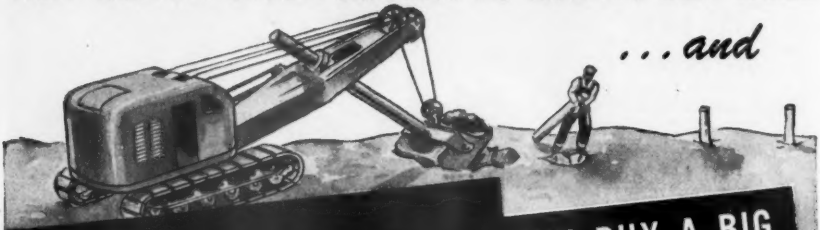
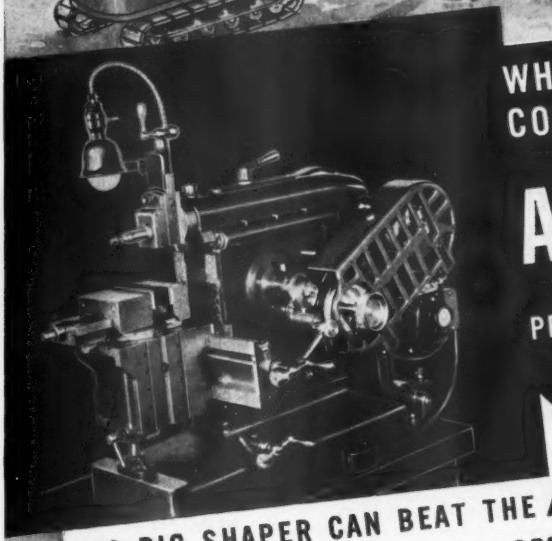
WHY USE A POWER SHOVEL TO DIG A POST HOLE

. . . and





WHY BUY A BIG COSTLY SHAPER WHEN THE

AMMCO

WILL GIVE TOP PERFORMANCE UP TO

7"?

NO BIG SHAPER CAN BEAT THE AMMCO

FOR *ACCURACY* ☆ *VERSATILITY* ☆ *SPEED* ☆ *ECONOMY*

The finest precision work with the very minimum of set-up time and results that will amaze you—that's what users of the AMMCO 7" Shaper report the world over. The AMMCO is not a "light weight" shaper; it's tough enough for the heaviest production schedule and perfect for all-around tool and die or shaping operations—it's the "precision machine of a thousand uses." It is available in bench or portable cabinet models. Write for a copy of our complete, illustrated catalog No. TD-848.

You can do it Better and Faster with AMMCO *Skill is Built into Every Ammco Product*

AMMCO TOOLS, INC. · COMMONWEALTH AVE. · NORTH CHICAGO, ILL.

FOR . . .
Accuracy
Better Results
Cost Reduction

. . STANDARDIZE with
A A. S. A STANDARD
B PRECISION
C DRILL JIG BUSHINGS

Made from the finest steel obtainable for the purpose. Each bushing carefully heat treated 62 to 64 Rockwell C hardness. All bushings inspected for accuracy of size, as well as for concentricity.

Complete factory stocks maintained at Garwood, New Jersey. Stock of all popular types and sizes maintained at Cleveland, Dayton and Stratford.

New catalog gives standard bushing sizes. Sent, with price list and other information indispensable to the tool engineer, upon request.

REPRESENTATIVES

BOSTON, MASS.
M. A. Siebert Co.
Garrison 0184

CLEVELAND, OHIO
Die Supply Company
UT 1-0850

DAVENPORT, IOWA
Davenport Engineering Corp.
DAvenport 2-1791

DAYTON, OHIO
Geo. D. Laughter Co.
Kenmore 4191

DETROIT, MICH.
Diemaker Supplies Co.
TRinity 1-2865

HOUSTON, TEXAS
Chickering Tool & Eqp't. Co.
W-6—8584

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Fink Tool Co.
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441 North Avenue, Garwood, N. J. • Westfield 2-2415

ABC TRADE MARK

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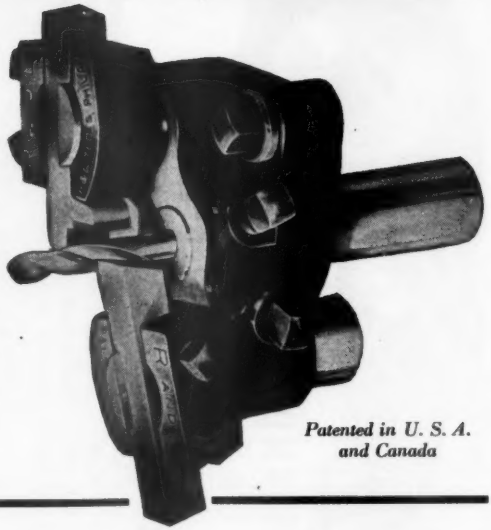
1=14 @ 1/4 The Cost

When The Tool Is an R and L Combination Turning Tool



Patented in U. S. A. and Canada

One R and L Combination Turning Tool, the only combination right hand and left hand tool on the market, actually does the work of 14 tools.

You can use an R and L for all these right hand or left hand applications: Roller Box Tool • Centering and Facing Tool • Knee Tool • Pointing Tool • Back Rest • Floating Drill Holder • Balanced Turning Tool.

The change from right to left or vice verse takes only ten seconds.

NEW R and L

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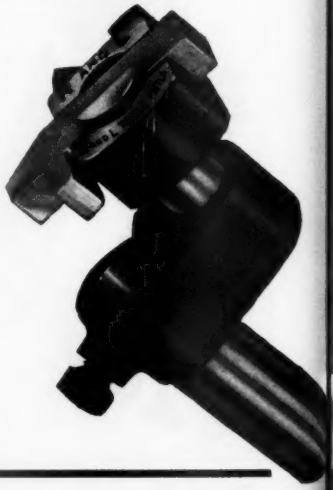
Simple design allows for convenient interchanging of R and L carbide surfaced backrest. Built in three sizes, 5/8", 3/4" and 1" diameter shank.



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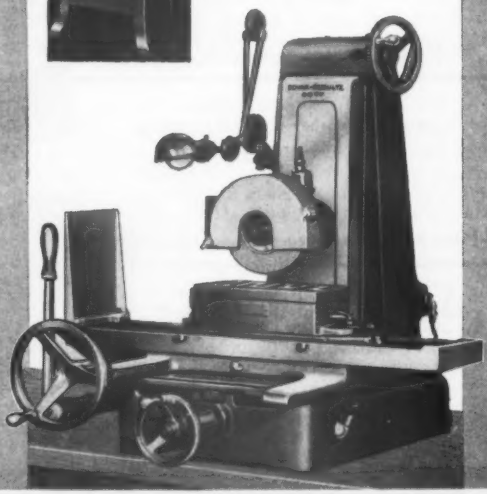

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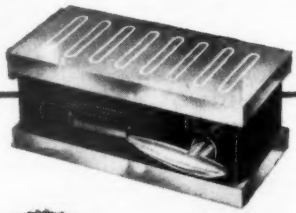

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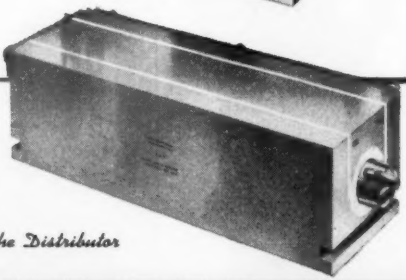

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The atomic chemists and physicists have instilled the term *chain reaction* into our every-day terminology as meaning a succession of occurrences set off by an initial impulse.

It is, however, much easier for us to visualize a chain reaction in our own field than in the realm of carbon-piles, uranium and plutonium.

We like to think of our TOOL & DIE JOURNAL readers as the key elements in constantly-occurring industrial chain reactions.

As new ideas are resolved through research, experiment and development into new articles of manufacture, it is the TOOL & DIE JOURNAL reader, in the composite, who is responsible for the design, procurement and supervision of the tooling, machines, equipment, plant and skilled personnel that are necessary to convert an initial idea into a salable product.

We can rightfully be accused of expressing this same idea in other words, many times before on this page. Our only defense is that the idea is so true and fundamentally sound that it is worthy of repetition. Further, it represents our sincere attempt to give credit where credit is due, i.e., to our TOOL & DIE JOURNAL reader.

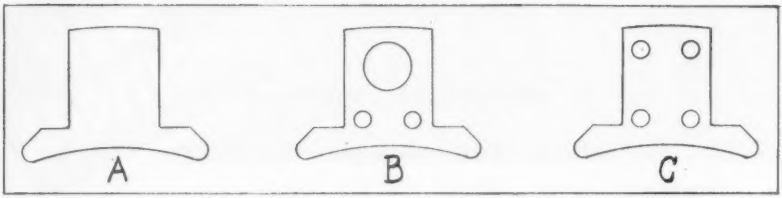
He is the director of manufacturing operations, the designer and supervisor of tooling, the tool and die shop proprietor, the chief engineer, the contract manufacturer, the toolroom superintendent or production manager, whose job is to build and buy the tools and machines for producing the things that others buy and sell. In our chain reaction scheme of things there can be no denying that he is one of the most important elements.

The planning and production for our editorial job is devoted solely to helping him in every possible way in attaining his objective. Our editorial pages, and our advertising pages, tell him and show him what tools and machines are used on jobs comparable to his; what special tooling has accomplished in cutting costs or increasing production; the savings that have been effected by replacing old tools and machines with new; and how new training, new skills, and new methods can contribute to meeting today's competitive demand for increased production at lower costs.

We like to feel, as we strive, not only to maintain, but to constantly improve our editorial presentations, that TOOL & DIE JOURNAL, also, may be considered a link in our chain reaction of tooling and production.

E. Willard Cunningham

editor



Sketches A, B and C: A field pole lamination conforming to all electrical requirements. (B) and (C) show provisions for fastening, both equally sound mechanically. From the standpoint of heat treatment of the die, as well as subsequent tooling and handling, (C) is the better choice.

Lamination Die Design

Laminations for the electrical industries are produced by a group of dies commonly known as lamination dies. The prevailing terminology sometimes hides this common name under a wide range of names such as: notching dies, blanking dies, compound dies, progressive dies, punching dies, rotor dies, field pole dies, etc., but the product produced by these dies will wind up as a lamination somewhere along the assembly line or in the stock room.

Other variations in lamination die terminology may be illustrated by the expression "die clearance" which may be understood as die allowance or, perhaps, open height. Taper in one establishment may be termed clearance angle in another. Ejectors as expressed by one designer may be called strippers by another and knock-outs by the pressroom foreman. The many ways of terming dies or their components and functions are not necessarily detrimental as long as the designers or engineers initially producing the tool know its functions and its characteristics.

A lamination die is merely one of the many thousands of tools used in the electrical industry, but it is different

by Martin George
Elliott Engineering Company
Cleveland, Ohio

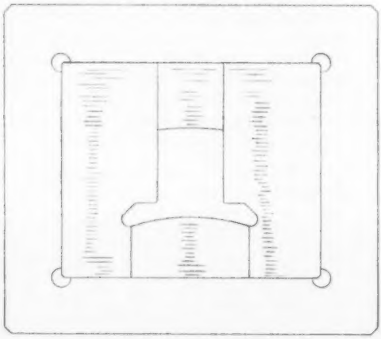


Fig. 1. A possible segmented die design for the field pole lamination, which, although constituting a minimum of four sections, presents most difficult toolmaking problems, as detailed in Figure 2.

from all the other tools. It is more than just a simple tool. It is often a very complex piece of mechanism that is required to produce a lamination to very exact dimensions under very exacting conditions.

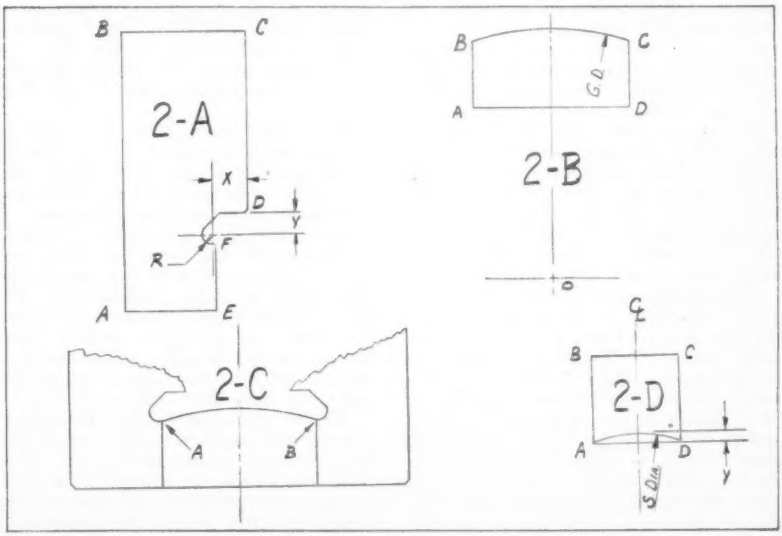
First of all, it is the most expensive single-purpose tool that is produced by the industry. It handles more material than any other tool of the same industry; and this material, lamination steel, is almost the worst that can be found from the machining point of view. The material is not very strong but it is very abrasive, and leaves its silicon scratch upon every die that works it. If the die be too hard, it chips; if it be soft, it is soon worn.

A die, unlike any other tool, is not adjustable once it's made. Minor corrections can be dealt with by various tricks of the trade, but its major specifications cannot be altered unless completely rebuilt.

Into a die goes more personalized, highly-skilled know-how than into any other single tool. The designer calculates and corrects his calculations for die clearance, stripper pressure, required horsepower, hardness, shrinkage, expansion, growth, and die life. His corrections of calculations are applicable to prevailing conditions and are derived from past experience. An error in any one, and a fauty die is produced. The toolmaker applies his know-how to the designer's estimates, corrects his work accordingly, and draws on his own experience for the fastening, grinding, and fitting. The heat treater estimates the heat, time, quench, distortion, and handling factors. The marvel of it all is that a lamination die works very close to the way it would if it were perfect.

The essential ingredients of guesswork, know-how, experience and craftsmanship cannot be removed from a die. They are to a die as character is to a person, without which you don't have very much, although it may look as

Fig. 2. In detail 2-A, below, curve R is re-entrant and impossible to produce by form grinding; the point at F will be weak and fragile; dimensions X and Y are difficult to maintain. The form of segment 2-B is to be avoided because of both grinding and assembly difficulties. Design of 2-C at points A and B is conducive to "pimples" or burrs which endanger electrical characteristics of motor. The sharp points at A and D (2-D) are fragile and should be reinforced.



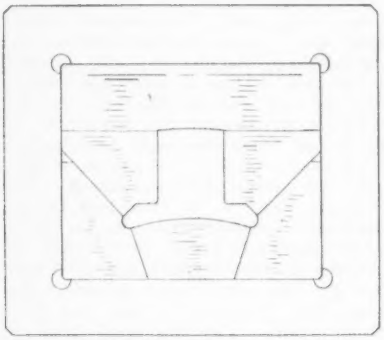


Fig. 3. A redesign of Figure 1 which, although calling for more individual segments (six compared to four), results in easier and more accurate toolmaking. The points of superiority are detailed in Figure 4.

though everything were all there. Moreover, no formula for determining the critical values of a complete or complex die seems to last very long because of the variables involved in deriving such formulas.

Certain practices allow approximations to a fine degree of accuracy; but only controlled conditions allow a continued and repetitive success through these practices. Individual theories must not be allowed to creep into standard practice. Rather, these theories must be carefully and judiciously injected where they will do the most good. All persons involved in the making and using of dies should follow the same theory line until it is found to deviate. Then it must be corrected, not at the point of deviation, but at the origin. This is necessary in order to do better as we progress.

The proper place to start attaining a good lamination die is in the design of the lamination. There are some unalterable features which every lamination must possess. Those features of a lamination that are not critical, and can be best classified as designers' choice, should be selected so as to produce the least difficult die construction problems. That is, avoid acute angles, sharp corners, thin-sectioned punches and dies, minute dimensional limitations, and the placing of auxiliary holes in such positions as to cause expansion of dimensionally restricted portions. The machining of idiosyncrasies into a die is so expensive that no amount of production will ever pay for it. In tooling, a very close liaison must exist between engineering, product design, manufacturing, and tool engineering. For die construction, this liaison must even be closer. Sometimes, it may be necessary to have the die design completed first, and the lamination design then completed accordingly.

This may be somewhat illustrated by a field pole. The sketch (A) indicates a field pole in which all electrical engineering requirements have been met. This field pole lamination now requires fastening. It may be accomplished by one of two methods, sketches B and C, both equally sound mechanically.

The amount of solid material in the pole can vary over a wide dimensional range, both according to size and distribution in pole. Although a choice may be made of either a progressive die or compound die, the compound die will produce a more accurate assembly. The only requirement for a compound die is that the lamination walls between pole shank and the rivet holes be sufficient to permit successful hardening, performance and maintenance of the die. "C" is the better choice not only for dies, but also for subsequent tooling and handling.

If the location of holes for rivets be dimensionally restricted before the die is designed, not only more costly dies may have to be produced but costs may also mount in subsequent operations. It must be borne in mind that, in leaning too heavily in the direction of an easy die, it is also possible to lose mechanical advantages of proper rivet placing. The happy medium must be sought before, not after, the dies are made. Many similar but not necessarily identical conditions exist in lamination design for coil cores other than field poles.

One of the most ticklish determinations is the clearance between punch and die. For lamination work, any value from 3 to 10 may be selected as the percentage of stock thickness required for clearance. The nearer the selection is

to 3 percent, the more expensive the die becomes, and the greater the press power required. The nearer the selection is to 10 percent, the less expensive the die, also less horsepower will be required on the press.

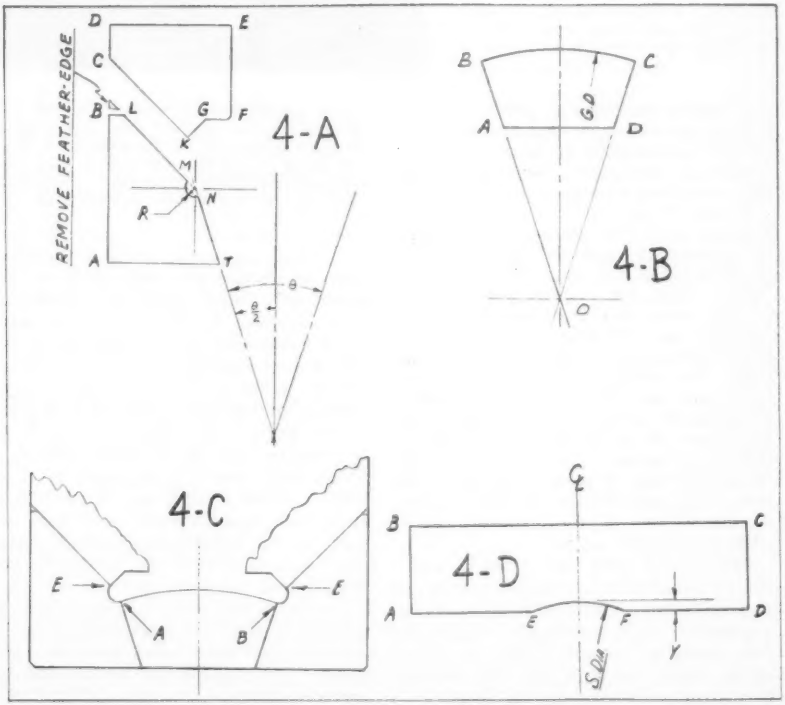
It follows that the smaller the die clearance, the less the burr. Yet burr and horsepower are not always, except in very simple dies, the determining factor for die clearance. The other factors are shape of lamination, accuracy of die making, accuracy of die assembly, and the allowable and necessary tolerances required on all the parts that mate and control the operation of the die.

For die clearance alone, let us progress through the various types of dies used in lamination work. If we begin with the simplest, it will consist of die set, fixed stripper, male and female punches and no guide posts.

We shall assume the press is dependable for perfect alignment between

(CONTINUED ON PAGE 62)

Fig. 4. Good tool design and toolmaking practice are evidenced in 4-A, below, where angle at K may be produced as a right angle; K is point of tangency to curve R at M; N is point of tangency to gap diameter curve, and line TN is radial to gap diameter curve. These specifications constitute "good grinding" by conventional setups. The design of 4-B permits production of true radius to blend with curve R of 4-A and is no more difficult to produce than the segment of Figure 2-B. In 4-C, assembly at points A and B must be flawless and protected against spreading, creeping or shrinking. Fit at point E not critical; must be such as to avoid unnecessary burr. Curve and tangency may be "faked in". Segment design 4-D offers greatly reinforced points at E and F as compared to A and D of Figure 2-D.



Why Hydraulic Presses?

Part II

by Herbert Chase, M.E.
Forest Hills, New York

Fig. 6. An H-P-M "Fastraverse" job of deep drawing washing machine tubs. Of 19 gauge stock, the tubs are 23" in diameter, 15¼" deep, and have a ⅝" flange. One run, of 1780 tubs, averaged about 100 draws an hour. The average scrap loss on 50,000 tubs was less than 1%.

In almost any shop in which both hydraulic and crank presses are used, the "tough" jobs usually go to the hydraulic presses as experience has shown that they yield best results.

A case in point is that of a maker of washing machines who purchased, from two competing suppliers, identical tubs of 23-in. dia., 15¼ in. deep with ⅝-in. flange, employing 19-gage steel, Figure 6. One, using H-P-M hydraulic presses, recently ran 1780 tubs without a single reject, averaging about 100 draws an hour. The average scrap loss on 50,000 tubs was less than 1%. The other, using crank presses for the same job, had losses in scrap up to 45% chiefly through breakage. This was laid to inferior steel but when ten blanks of the same steel were sent to the first supplier he ran all ten in the hydraulic press without a single reject.

The second shop also employs some H-P-M presses but keeps them busy on tougher jobs. One of the latter is on a piece about 25 in. square but having 2-in. radii at corners. This is drawn 18 in. deep and is considered feasible only when a hydraulic press is used.

Another stamping company reports making a deep drawn electric switch box cover in a single draw on a hydraulic press whereas the same part, as made by a competitor on a crank press, required four drawing operations with, of course, separate dies for each draw. Among the jobs done on an H-P-M press in this plant is an extractor tube 17 in. in diameter and 10 in. deep made in a single draw from a 31-in. blank of $\frac{1}{32}$-in. steel. After setting up the die, trial runs were made on cold-rolled steel but both Monel metal and 18-8 stainless steel blanks were then drawn in the same die at the same speed.

In the same press, this plant finds it possible to draw, without undue trouble, inferior steel that, when used in crank presses, gave prohibitive trouble and excessive rejects.

Fig. 7. A bulging die operation on an H-P-M triple-action deep drawing press. In the foreground are the workpieces from the initial drawing operations. The pressure necessary for the convexing or bulging operation is produced by the same pressure generator used to operate the other press actions. These McCormick-Deering cream separator bowls are produced by the Milwaukee Works of International Harvester Company from either 20 gauge stainless or 18 gauge drawing quality sheet steel, depending upon the model and size of the separator.

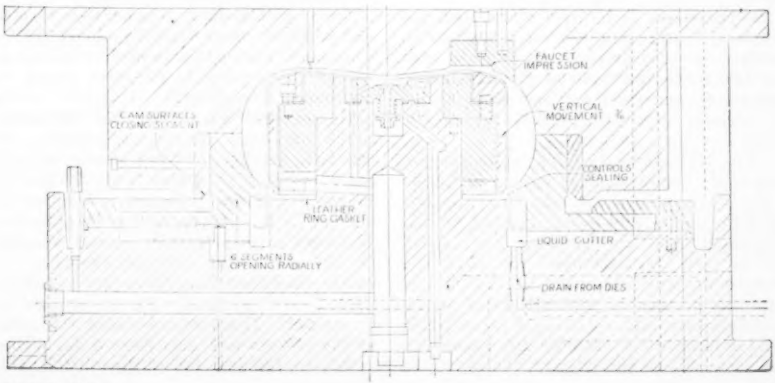
Fig. 8 (below). Section of a bulging die for doing a job similar to that shown in Figure 7; in this case, the supply can for an International Harvester milk separator. The cam-actuated segments in the base move radially, thus allowing loading and removal of the work. In the loaded, or closed position, the mouth of the can is effectively sealed against the 3000 psi hydraulic pressure which is applied internally to expand or bulge the work into the die cavity.

An engineer of this company states that, for a ¾-in. draw-and-coin operation on a plate of 7-gage steel 11-in. in diameter, "Our hourly production rate . . . is somewhat higher than the average on such jobs", this applying to an H-P-M press as against crank presses used for the same job.

According to C. E. Lenhardt, Dow Chemical Co. (makers of magnesium alloys), "Either a hydraulic press or a mechanical press, slowed down, may be used for drawing magnesium alloys. The hydraulic press has the advantage of *controlled speed* during the drawing operation."*

It has been found that when work is fracturing or "scoring", a reduction in drawing speed will often minimize these

**The Iron Age, 3/18/43, p 46.*



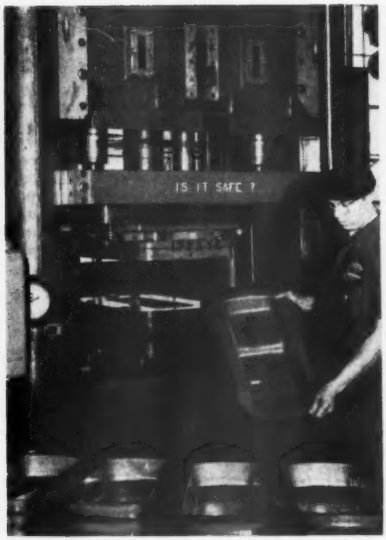


Fig. 9. Another International Harvester job being run on an H-P-M "Fastraverse" triple-action press. These International engine oil pans are drawn from 18 gauge steel; the blanks measuring 18½" x 33½". Production is 250 pans per hour.

troubles because the lubricant is given a better chance to perform its task and the possibility of work hardening of the metal by the descending punch is lessened.

From these facts it is clear that the hydraulic press has a clear advanage in ability to control speed. It can also run as fast as the mechanical press on many drawing operations and generally yields a higher output of perfect pieces per hour.

Although some mechanical presses may run through more cycles per hour even on certain draw jobs than the hydraulic press, this is not always an advantage from an economic standpoint. It is well to remember too that the maximum working speed of H-P-M hydraulic presses is a function of pump displacement and, by using a large pump and driving motor, almost any speed can be secured. In this regard, the objective should be to choose that size of pump which yields the optimum return for a given investment under average operating conditions. This size is the one commonly recommended and supplied on H-P-M presses.

As there are in common use many H-P-M presses of single-action and double-action types, the feasibility of these types requires no other proof. The second action, when needed, is commonly applied to the draw ring and, when a third action is needed, an extra ram can be fitted in the bed. Any action not needed can be rendered inoperative by cutting off flow of hydraulic fluid to the rams involved and without such mechanical alterations as are needed to accomplish the same effects on corresponding mechanical presses.

That, in the hydraulic press, dies are rapidly and readily changed with a minimum of setup time becomes clear when the nature of such presses is considered. In general, but especially with bottoming dies, the crank press, having a fixed stroke and positive ram travel, must be set so that, at the end of the stroke, the dies are closed with just enough pressure to produce desired results. In other words, shut height is critical and dies must be precisely adjusted to secure desired results. This often demands blocking up and shimming which is a slow process requiring skill, especially when blankholder pressure must be closely held. If not correctly done, the press or die may be subjected to excessive pressure or even be broken. If dies do not meet properly, imperfect results are secured. Any considerable variation in stock thickness from piece to piece or in the same piece is likely to result in imperfect stampings.

In contrast with this, the hydraulic press simplifies die setting greatly, for the ram, having no fixed stroke, adapts itself to the job. There is no fixed shut height. A given pressure is applied to the punch as well as to the blankholder and both come to rest in correct relation to the die. Any normal variation in stock thickness has little or no effect upon results secured. No die shimming is needed. These factors save the time of die setters and also have a favorable result in making for uniformity in the

product secured. In effect, dies are as nearly "self-setting" as they can be made. In other words, the die setting skill needed is at a minimum and the die setting costs also are minimized. This feature of quick die setup is particularly important today with so many die changes necessary because production runs are governed by low material supply.

For reasons paralleling those already given, blankholder pressure is adjusted almost instantly on H-P-M presses. This applies not only to the total pressure but to different portions of the blankholder ring. This is because, in the H-P-M presses, the pressure is created by several small rams which provide the secondary action of the press. There is a gage to indicate this pressure on each ram and a corresponding relief valve, conveniently located, by which the pressure can be instantly varied.

This feature is of great advantage for it enables the operator to control drawing action without stopping to apply shims. Drawing action is controlled by the friction between the blank and the blankholder and is varied by changing the pressure on the blankholder. In the mechanical press, this blankholder pressure is commonly controlled only by shims under the ring operated by the second action. Changing the shims in such cases is a time-consuming job partly because the actual pressure remains unknown and only cut-and-try methods are applicable.

If the die is removed, the same procedure is needed in resetting but, with the hydraulic press, if a record is kept of the blankholder settings found correct to do the job, these settings are easily duplicated merely by adjusting the respective gages provided to give the recorded pressure. Savings thus made are not only in time but include reduced waste in blanks, which occurs through the rejects that cut-and-try methods commonly entail on the mechanical press.

"As the blankholder pressure can be very easily regulated by means of a control valve, fine adjustment of the blankholder is not required.

"Far finer control of the pressure-plate will probably be found to be unsuspected benefit in the production of deep-drawn shapes in one or two operations; the crudeness of the old type of spring-loaded pressure-plate has precluded the following-up in practice of the indications already given by research.

Fig. 10. The new H-P-M "Economy" 50 ton press. Inclinable to 30° by hydraulic tilting control, this press operates at 50 to 100 strokes per minute, depending on work stroke.

"It is likely that more attention will be given to the control of the pressure-plate, because the practical drawing tests now being carried out in many laboratories show, for example, that in some metals the depth obtainable on a second draw is influenced to a surprising degree by the loading imposed on the pressure-plate in the *first* draw."*

"The fact that the plastic working or rearrangement of the metal takes place almost entirely in the blankholding area makes the holding means extremely important."**

*Jevons: *The Metallurgy of Deep Drawing and Pressing.*

**Crane: *Plastic Working in Presses.*

(TO BE CONTINUED)

New Developments in Tool Steels — *Part II**

Molybdenum Irons

Since one of the most important problems in hot work die steels metallurgically concerns itself with the elimination of heat checking, intense interest is given to any steels which are designed to eliminate this condition. One of the metallurgical factors commonly believed to contribute to heat checking is alternate heating and cooling through the transformation temperature range in operation. With this in mind several die materials have appeared with high transformation ranges.

by George A. Roberts
Chief Metallurgist
Vanadium Alloys Steel Co.
Latrobe, Penna.

Among these are the so-called molybdenum alpha irons in which a low carbon content, .10 to .20%, and a high molybdenum content, 3.00 to 5.00%, combine to give an increase in the transformation temperatures of several hundred degrees Fahrenheit over those steels normally employed for hot work applications. Being of such low carbon content, these steels have both a limited maximum hardness and a limited hardenability. They have had some good success in centrifugal casting molds and for some few hot working applications, however. Ordinarily the hardness is not great enough to give good cross-sectional strength and rigidity for large size, highly stressed hot work parts.

Tungsten-Chromium Steel

Like the molybdenum alpha irons, a tungsten-chromium material developed for hot work also possesses a high critical temperature and resists heat checking which results from this cause. This material is an oddity in the field of tool steel metallurgy, containing .30% carbon, 12.00% tungsten, and 12.00% chromium. During heat treatment, at no temperature up to the melting point is it possible to completely eliminate all of the ferrite, and a mixed tempered martensite-ferrite structure exists in the final part. It possesses an extremely high resistance to tempering at medium hardness levels, a typical heat treatment consisting of oil quenching from approximately 2300° F. and tempering for several hours as high as 1500° F. to obtain a hardness of 30 to 32 Rockwell C. Maximum secondary hardness, which is pronounced, is obtained at 1200° F. The steel has been employed at 40 to 47 Rockwell C with good success for permanent molds for brass and bronze casting; at 40 to 45 Rockwell C it has had some mild success on brass die casting dies; and is reported

*Part I—TDJ March 1948

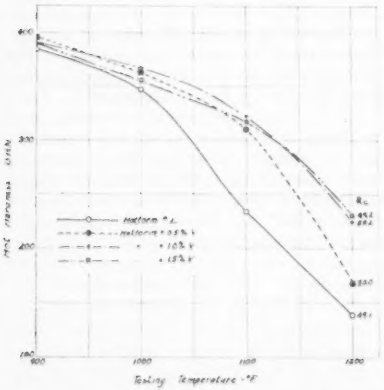


Fig. 6. Effect of Vanadium on the Mutual Indentation Hardness between 900 and 1200° F. of 5% Chromium hot work die steels. All samples initially treated to 49-50 Rockwell C. A. H. Grobe, Vanadium-Alloys Steel Company.

good at 28 to 32 Rockwell C for brass tube extrusion dies. The fact that ferrite exists even at the melting point causes a very coarse fracture appearance under any conditions of heat treatment.

Vanadium in Chromium Hot Work Steels

The last development in the field of hot work die steels is a normal one that has been debated for years. It involves the question of how much, if any, vanadium should be added to the largest selling type of die steel for hot work. This type contains normally .35% carbon, 5.00% chromium, 1.00% molybdenum, with or without 1.50% tungsten. Certain consumers and certain manufacturers have advocated the addition of vanadium during recent years, and vanadium-containing grades are now available if desired.

Test reports from the field are extremely conflicting as to the benefits obtained with a vanadium addition. It is known that the machinability is altered and that the hardening and tempering reactions are changed to some extent. Vanadium may refine the grain, although these are normally fine-grained steels. The most important effect of vanadium is that of increasing the hot hardness, an effect that has been proved conclusively. Figure 6 illustrates the effect of increasing amounts of vanadium on the hot hardness of this type of steel. The hot hardness was measured by the Mutual Indentation Method on samples that had been initially hardened and tempered to produce a hardness of 49 to 50 Rockwell C in all instances.

A similar set of curves has been obtained on samples which were initially treated to a hardness of 44 to 45 Rockwell C. While continuing additions of vanadium appear to further increase the hot hardness of this grade, an optimum of vanadium in this respect is set at about .50%. The use of just this amount of vanadium in the chromium hot work steels is further justified by the fact that those grades containing higher amounts command a premium of 3¢ per pound, whereas those containing .40 to .50% vanadium are offered at no increase in price. Vanadium has an effect upon the hardening and tempering reactions as shown in Figure 7, in which a tempering

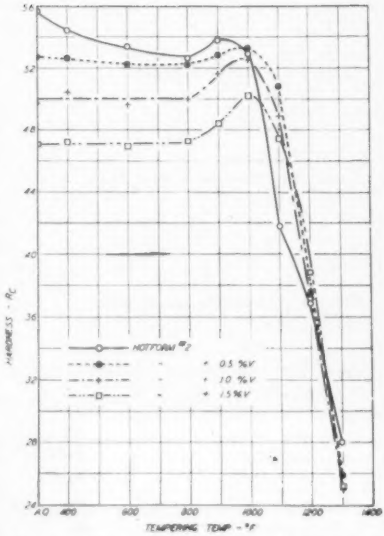


Fig. 7. Effect of Vanadium on the tempering characteristics of 5% chromium hot work die steels. All samples air cooled from 1850° F. A. H. Grobe, Vanadium-Alloys Steel Company.

curve is illustrated for three different levels of vanadium content as compared with the base steel not containing vanadium. The samples in this instance were hardened from 1850° F. in still air.

High Speed Steels

In the field of high speed steels we have developments in composition, heat treatment and testing. Composition developments have been confined largely to developments of molybdenum high speed steels with cobalt and boron and to developments of high carbon-high vanadium materials.

New Compositions

Since high speed steels are characterized by certain properties and a certain response to heat treatment, rather than by any one composition, innumerable combinations of carbide-forming elements, carbon and iron, yield a reasonable facsimile of the original grade. Figure 8 is a chart of some of the more standard

	Composition					
	C	W	Mo	Cr	V	Co
Class 150—Tungsten Types						
151—18-4-1	0.50–0.80	18.00	....	4.00	1.00	....
151—18-4-2	0.80	18.00	0.80	4.00	2.00	....
153—14-4-2	0.75	14.00	....	4.00	2.00	....
154—18-4-3	0.95	18.00	....	4.00	3.00	....
Class 160—Tungsten-Cobalt Types						
161—18-4-1 + 5% Co	0.75	18.00	0–0.80	4.00	1.00	5.00
162—18-4-2 + 8% Co	0.75	18.00	....	4.00	2.00	8.00
163—14-4-2 + 5% Co	0.75	14.00	....	4.00	2.00	5.00
164—20-4-2 + 12% Co	0.75	20.00	....	4.25	1.75	12.00
165—14-5-5 + 5% Co	1.50	14.00	....	5.00	5.00	5.00
Class 170—Molybdenum Types						
171—Mo-W	0.75	1.50	8.50	4.00	1.00	....
172—Mo-V	0.80	....	8.25	4.25	2.00	....
Class 180—Molybdenum-Cobalt Types						
181—Mo-W + 5% Co	0.80	1.50	8.50	4.00	1.25	5.00
182—Mo-W + 8% Co	0.80	1.50	8.50	4.00	2.00	8.00
Class 190—Tungsten-Molybdenum Types						
191—W-Mo	0.80	5.75	4.50	4.00	1.50	....
192—W-Mo-V	1.25	5.75	4.75	4.25	4.00	....
Class 200—Tungsten-Molybdenum-Cobalt Types						
201—W-Mo + 5% Co	0:80	5.75	4.75	4.00	1.50	5.00
202—W-Mo + 8% Co	0.80	5.75	4.75	4.00	1.50	8.00

Fig. 8. Table Of High Speed Steel Compositions.

compositions of high speed steel that are available today.

Molybdenum-base steels, now more greatly favored than ever before because of price differential, are experiencing many modifications for special applications. One molybdenum steel adds boron, another titanium and one, now nine years old, added extra vanadium for two years before it was modified to a molybdenum-tungsten steel with the same extra vanadium (See No. 192, Figure 8). Cobalt additions are, of course, made following the precedent of adding this element to tungsten high speed steels for improved hot hardness (See Steels 180 and 200, Figure 8). Cobalt additions to molybdenum high speed steels, however, further add to the complications caused by a high rate of decarburization.

Breaking a precedent of fifty years' standing, two high speed steels are now manufactured with a chromium content different from 4.00%. One of these steels is a molybdenum-cobalt steel containing 8.00% chromium, while the other contains 5.00% chromium but is characterized by a higher carbon and vanadium content than ever before obtained in high speed steel metallurgy. The latter steel carries a carbon content of 1.50% and a vanadium content of 5.00%, combined with 5.00% cobalt, 5.00% chromium on a base composition of a tungsten high speed steel (See No. 165, Figure 8). It is capable of obtaining an intensely high hardness and has the highest wear resistance of any high speed steel manufactured to date.

This vanadium addition promotes wear resistance by the formation of a separate vanadium carbide in the steel, as well as through the addition of extra quantities of carbide particles. A balanced carbon and vanadium is necessary in order to achieve forgeability and hardenability in these high carbon grades, of which two are available at levels of 1.25 and 1.50% carbon.

(TO BE CONTINUED)

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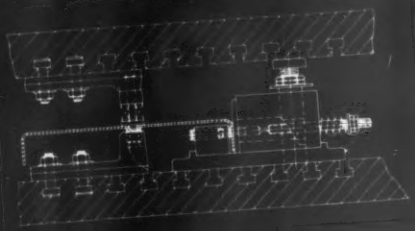

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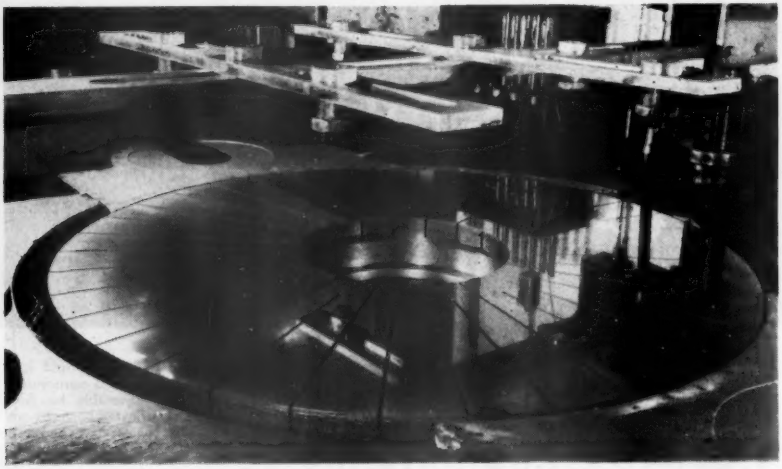
Fig. 1. A striking illustration of the optical perfection of the LAPMASTER lapping table surface is this photograph showing the specular or mirror-like reflection of nearby objects. What might be taken for a scratch just to the right of the table center is a reflection of the small copper tube that feeds the floating grit onto the revolving table. As explained in the text, the lapping table is continually being conditioned during the lapping cycle and the table wears the work, but the work does not wear the table. This contradiction to the usual concept of lapping is accounted for by the design and construction of the LAPMASTER.



Self-Conditioning Lap Achieved by New Lapmaster Design

The development and introduction of a new concept in lapping machine design and function by the Crane Packing Company of Chicago reduces the highly specialized art and craftsmanship of precision lapping to a machine operation within the reach of any shop requiring lapping facilities, either in production runs or on individual jobs. Further, the devising of a self-conditioning lapping tool combined with an automatic timer for the lapping cycle precludes the necessity for highly skilled operators.

This new concept is that the lapping surface which does the work shall not be worn out-of-truth by the work it does. This idea that lapping can be performed without consequent degradation of the lapping surface, thus necessitating expensive interruptions of the procedure for the purpose of re-dressing or replacing the lap, is a little startling, but is just another example of "it's simple when you know how".

In effect, the Crane engineers said, "As long as a lap, in performing its job, is subjected to undesirable wear, isn't it logical that the shortest short-cut to licking that evil would be to substitute *desirable* wear for *undesirable* wear? In other words, if we devise a means for truing-up a lapping surface faster than the work can 'untrue' it, that surface will be maintained in a constant state of perfection".

The end results of their reasoning, research and development are embodied in the newly-introduced John Crane LAPMASTER lapping machines.

Fig. 2. This 12" LAPMASTER, as well as the larger models ranging up to 72" (effective table diameter, less center hole), is equally adaptable to single, small lot or high production output. Precision lapping is reduced in simplicity to manipulation of the table drive and lapping compound agitator switches, setting the automatic timer for the predetermined lapping cycle, and loading and unloading the workpieces.

The LAPMASTER machine consists of an alloy iron lapping plate rotated by a gear reduction motor, a system of wear rings and workholders which are held in position by adjustable bars, and a continuously agitated compound tank, plus the necessary "on-and-off" switches and an automatic timer for predetermined lapping cycles.

Figure 3 shows in close-up detail the LAPMASTER lapping plate, wear rings, workholders and workpieces. The wear rings are plainly identified as containing the workholders, and are grooved or channeled on their bottom peripheries in the same manner as the top surface of the lapping plate. The adjustable bars hold the spindles of the wear rings in any desired location on the lapping

Fig. 3. The LAPMASTER method involves a power-driven lapping table and free-rotating wear rings and workholders. The wear rings are shown here as they "ride" on the lapping table, and inside the wear rings the workpieces are seen loaded in the workholders. As the large, motor-driven lapping table revolves, the wear rings, workholders, and individual workpieces are free to generate their own axes of rotation. Because the wear rings are constantly and uniformly wearing the lapping table during the entire lapping cycle at a greater rate than any table wear caused by the workpieces, the result is that the lapping table surface is continuously maintained in a state of perfection.

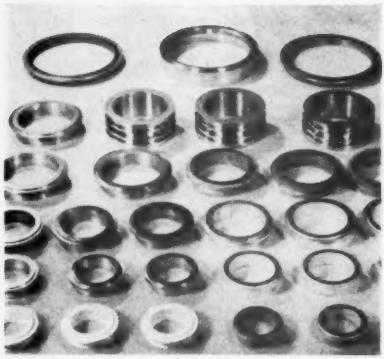


Fig. 4. A representative variety of workpieces lapped to light wave accuracy of surface flatness by the new LAPMASTER technique. Materials such as cast iron, ni-resist, bronze, stainless steel, carbon steel, Stellite, and various ceramics are quickly lapped to precision tolerances.

plate, but the wear rings are perfectly free to rotate about their respective spindle axes. It is this free rotation of the wear rings as they rest upon the revolving lapping plate that continuously conditions the lap.

The workpieces to be lapped are loaded in the cage-like workholders and are placed on the lapping plate within the wear rings. Each workpiece is unrestrained and free to rotate about its own axis. Likewise, each loaded workholder is free to rotate within the confines of its wear ring. It is this multiplicity of free rotations of the wear rings, workholders and workpieces within their respective orbits that provides the continuous self-conditioning of the lapping plate and which affords controlled and continuous accuracy in flat, concave or convex lapping to within less than one light band per inch of work surface while holding to micro-inch surface finishes of 1 to 3 RMS.

The LAPMASTER method of rotating the work within a given orbit enables the LAPMASTER to be conditioned to do concave or convex lapping (in addition to flat lapping) and to specified tolerances, i.e., a 1" diameter disc which is required to be uniformly lapped concave within .0000348, plus or minus .0000116.

A floating grit is used on the lapping plate instead of a paste grit. The surplus abrasive or grit and the particles of the work abraded during the lapping process are automatically removed through the grooves or channels in the lap and wear rings and by centrifugal force.

Because the LAPMASTER is continuously presenting a newly-conditioned lap surface to the work, its rate of metal removal is fast; finely machined workpieces may be put on the LAPMASTER direct from screw machine, lathe or miller.

Fig. 5. A 48" LAPMASTER with a setup of four wear rings and workholders, and equipped with hydraulic cylinders for lifting the wear rings. In some instances, governed by the weight and shape of the pieces being lapped, the work may be loaded on the lapping table and inside the wear rings without resorting to workholders or cages. Further, workpieces of a variety of shapes may be loaded within a wear ring and lapped as a group.

Additional and detailed LAPMASTER information and specifications may be obtained from Crane Packing Company, 1800 Cuyler Avenue, Chicago 13, Ill., or by using our postage-free Inform-A-Gram Key No. D80.

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Electrolizing Prolongs Tool Life and Protects Wear Parts

Electrolizing is the name of a new process-treatment that greatly prolongs the life of cutting tools, dies, gages and wear parts. As regards cutting tools and dies, the improved performance is experienced both in the tool's initial life and in subsequent life between grinds.

Electrolizing involves two procedures: (1) A high-frequency treatment which raises the fatigue point of the tools, and (2) a process of evaporation and condensation by which a .00003" to .00005" layer of a new hard alloy is deposited upon the cutting edges or working surfaces.

Consequently, the dimensional accuracy of Electrolized tools and dies is not affected by more than .00005". The Electrolized surface has an 81 Rockwell/c hardness value and is nonmagnetic. Chip weld and galling are virtually eliminated, and the resultant low coefficient of friction provides a freer cutting by reduction of chip and surface friction. It is the 81 R/c surface hardness which accounts for the great increases in wear resistance.

The first stage of the process, the high-frequency treatment mentioned above, contributes to prolonged tool life because of the stress-relieving that is attained. It has been estimated that from 25% to 50% of the potential life of a new cutting tool is never realized because of strains that are set up by the initial grind. Dry grinding sets up tensile strains and wet grinding sets up compression strains as well as tensile. The surface stress relief that is characteristic of the high-frequency phase of the Electrolizing process insures against warpage, distortion and embrittlement of even the thinnest cross-section. It is most interesting to note that this stress-free condition and dimensional stability are attained even though at no stage of the Electrolizing process is the tool subjected to a temperature higher than 104°F.

Lamination dies represent one of the most severe and critical wear problems in metal working. A three-times increase in die life is being reported after the Electrolizing of lamination dies. As the face of the die is ground in subsequent sharpenings, the new cutting edge retains full benefit of the process.

On threading operations where taps have been replaced once or twice a day, Electrolizing has resulted in tap life of up to 30 days. The several manufacturing divisions of a large corporation have standardized throughout on Electrolized taps and drills.

In the manufacture of gears, broaches which averaged 50 to 75 pieces between sharpenings produced 700 pieces after Electrolizing, with no indication of need for resharpening. One rifle barrel broaching case history reports an increase of 533% in production per broach.

The experience to date in treating milling cutters shows an average life increase of 200 to 300%. Carbon steel, bent shank, tapper taps have shown performance improvements up to 700 - 800%. A six-month test on machining armor plate recorded a 42% increase in cutting tool life.

Many other Electrolizing applications, of wide diversity, are showing comparable performance improvements, i.e., such wear parts as cams in locks, wire drawing dies, plastics molds and extrusion dies and die-casting dies.

Indicative of the severe service to which an Electrolized surface can be subjected is the experience of a large foundry in having metal core boxes Electrolized. In the making of sand cores, filling and cleaning the boxes results in rapid wear and loss of size. The treated surface resulted in a greatly multiplied core box life.

The Electrolizing process constitutes a service rendered the cutting tool industry by the Electrolized Tap Corporation, 148 West River Street, Providence, Rhode Island, and Electrolized Tap of Ohio, 1650 Collamer St., Cleveland, Ohio. Additional detailed information may be had from the company or by use of our postage-free **Inform-A-Gram Key No. D73.**

An Important Merger of Two Great Names in Precision

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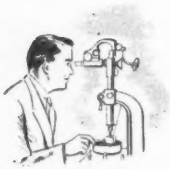

★ On June 3, 1948, Brown & Sharpe Manufacturing Company purchased the Johansson Division from the Ford Motor Company, with all rights to manufacture and distribute Johansson Gage Blocks and Accessories throughout the Western Hemisphere. In achieving this transfer, Brown & Sharpe is fully aware of the great responsibility that goes with it . . . a responsibility for maintaining an unprecedented standard of precision which Ford shouldered faithfully for 25 years.

Now, into one identity, are merged two of the world's great names in precision measuring tools . . . *Johansson*, the name that carried new precision into mass production of interchangeable parts . . . and *Brown & Sharpe*, the name that has symbolized leadership in the development and manufacture of precision measuring devices, machines and tools for more than 100 years.

Brown & Sharpe has acquired special equipment and processes including a stock of thoroughly-seasoned Johansson Gage Blocks and Accessories. This stock will be available to supply industry's requirements until Brown & Sharpe is in production of full-standard Johansson Gage Blocks and Accessories in special quarters at its own plant in Providence.

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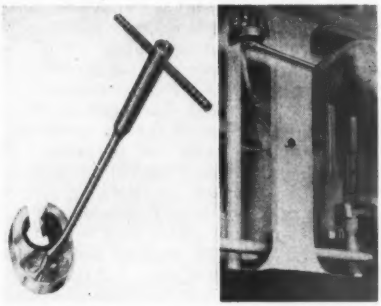
Open-End Ratchet Wrench

A new type of wrench is now available to those industries using pipe, tube, rod and cable fittings. The T. A. C. open-end ratchet wrench consists of a ratchet head, shown in the left portion of the illustration, and open-end sockets of varying sizes.

The T. A. C. wrench is particularly adaptable on assemblies and installations in hard-to-reach places. The open-end feature permits the wrench to be slipped



over the tubing, pipe or rod and the socket insert easily set on the nut. With a 7½° ratchet turn of the head, nuts can be run on or off fittings in a minimum of time as compared to the conventional method. Because of the swivel design of the ratchet head handle, fittings can be reached in any of four different positions: handle lying horizontally to the right of the work, to the left, directly in front, or vertically. To reverse direction the ratchet head is turned over.

The T. A. C. is now standard equipment on U. S. Naval vessels under BuShips specifications CS-W-174. To meet these specifications the leverage pressure is tested to 2000 inch pounds. This wrench is applicable on hydraulic, lubrication, engine fuel, and pneumatic lines, nuts with long studs, refrigeration, aircraft, and railroad equipment.

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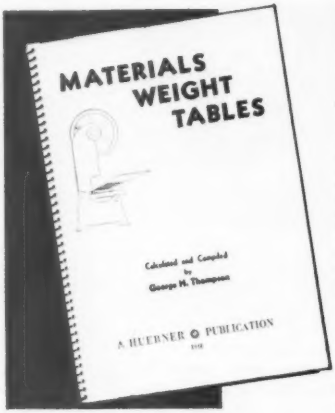

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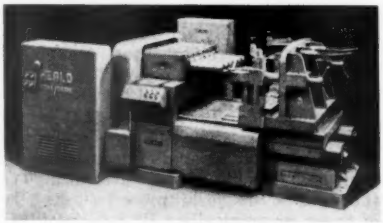
New Heald Bore-Matics for Large Work

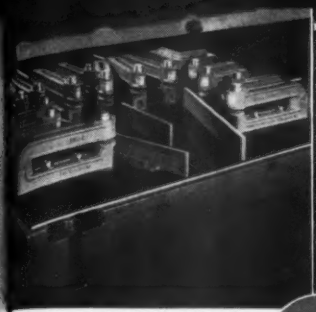
Three massive, powerful machines have been added to Heald Machine Company's line of Bore-Matics, designed for precision boring, facing, turning, chamfering or grooving operations on large, heavy work. Awkward, unwieldy work such as workheads, tailstocks, cylinder blocks,

connecting rods and so forth can be easily and conveniently handled, since the table is built low to the floor permitting easy loading from conveyor or overhead crane. Increased production at lower costs is possible with these versatile machines, which are all basically the same except for their lengths. Model 522 shown in photograph above is the double-end machine, while Model 521, photographed at right, is the standard single-end machine. Not shown is Model 524 which is a single end with long base for extra capacity requirements. All three models have heavy, rigid one-piece base castings with widely spaced, carefully scraped vee and flat ways extending nearly their entire length. The boring heads are permanently lubricated—for life—during original assembly, require no attention, and run extremely cool. From one to seven or more individual boring heads, or a multi-spindle head unit can be installed on each bridge, providing a wide range of application possibilities in the same setting. When two-way boring is required, a simple control setting makes available different rates of "in" and "out" feeds. Push buttons controlling the entire cycle are mounted in the front of the bridge. Model 522 may be operated from either bridge. The machines are provided with adequate power for roughing, as up to ten or more horsepower is available at each end of the machine providing maximum power for heavy roughing cuts and higher speeds when using multiple heads. Because of an outboard tank and drive, any effects of heat and motor vibrations are eliminated. Motors are belted to heads through direct V-belt drives. A uniform, constant hydraulic feed is maintained throughout the day regardless of oil temperature changes resulting in definite production, finish and accuracy. A new constant pressure dump valve automatically furnishes only the amount of oil required during each phase of the entire machine cycle—saving power cost, lessening generated heat and improving accuracy. Provision has been made on the main control panel for the convenient installation of units for operations of hydraulic fixtures, cross slide, chucks, etc. The standard hydraulic circuit is capable of being set for a wide variety of cycles, many of which may be entirely automatic except for loading and unloading. An adequate system for control of

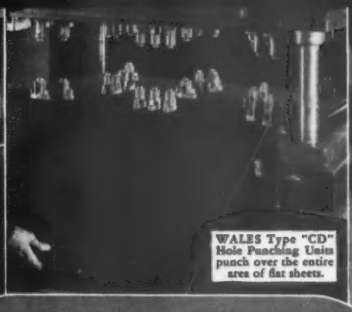


chips and cutting fluid is provided in the tray-type table which confines chips and cutting fluid, and keeps the floor clean and safe. A sensitive brake adjustment permits instantaneous action at predetermined points in the cycle, cutting down boring time and tool wear when facing.

Further details from The Heald Machine Co., Dept. 64, Worcester 6, Mass., or circle our postage-free **Inform-A-Gram Key No. D78.**



WALES Type "BL" Hole Punching Units punch round and shaped holes in flat sheets.



WALES Type "CD" Hole Punching Units punch over the entire area of flat sheets.

WALES Type "C" Hole Punching Units pu angles, channels, extrusions and flat shee

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WALES Type "CJ" Hole Punching Units are duty to punch angles, channels, extrusions and flat sheets up to ¼" thick.

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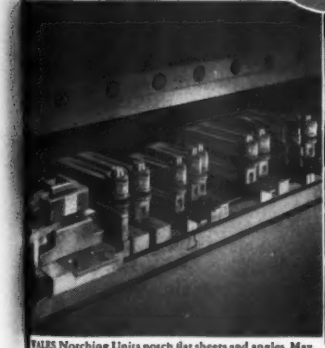
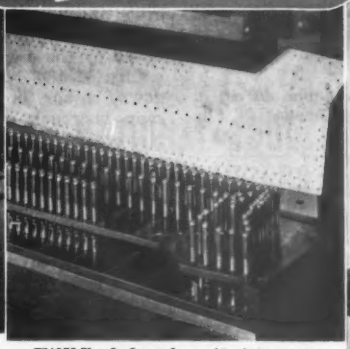
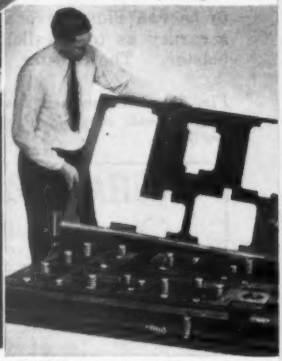


WALES Notching Units notch flat sheets and angles. May be used in setups with Type "BL" Units for punching and notching in same operation.



WALES Plate Set System for punching holes over the entire area of flat sheets.



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The above complete line of hole punching and notching equipment is one reason why so many manufacturers standardize on Wales Units for *long and short production runs.* In fact, many have adopted this standard practice rule:—Before putting holes in angles, channels or sheets by any method, call on Wales-Strippit FIRST.

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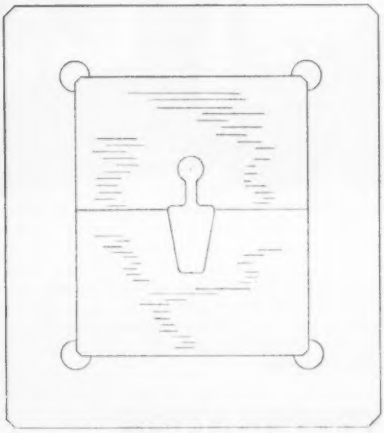
(CONTINUED FROM PAGE 43)

punch and die. However, consider the difficulty of setting up a die with 3 percent clearance on No. 26 gauge stock. The slightest wobble of the ram will cause the die members to scrape each other. Chipping may result. True, there will be no burr.

Now, let us incorporate guide posts on this die. It will be readily seen that a high degree of accuracy in the location of these posts is required. The total amount of deviation from exact positioning of guide posts is determined by the shape of the lamination (distance from posts to most remote point of lamination contour) and the fit of the bushings on the guide post.

Let us incorporate another station into this die. Whether it's progressive or compound does not matter much. It now becomes necessary to match two dies within the allowed tolerances. The costs of such accuracy for location have definitely mounted and clearance must be accorded proper and judicious consideration. The die must not cause burr; it must also line up, and it cannot be sloppy. The press in which this die is to be run must have a high degree of accuracy as to parallelism of ram and bolster. The bolster must also give maximum backing to die shoe; otherwise, errors of construction will be magnified by distortions produced through use.

Fig. 5. A two-segment lamination die design that presents the difficulties detailed in Figure 5-A.



Chipping, guide post wear, and burr are not always due to construction. They are often caused by bad press conditions or poor mounting on press. A good die set can be ruined in a poor press.

It can now be seen that a die must start with superb engineering, and continue through flawless design, accurate assembly, careful use and maintenance so that it may lead a long and profit-producing life.

Causes of Burr

The causes of burr are many. Burr, however, is not always objectionable and, in some respects, it is rather helpful. Its objectionable electrical feature is that, if the burr makes contact with an adjacent lamination, it tends to produce a solid core effect, thereby defeating the purpose of laminating. Its helpful effect is that it speeds assembly by tending to prevent stacking upside down. All laminations produced by a given die may be stacked satisfactorily if stacked in the same manner as produced by the die, but when stacked with a turn of 180 degrees or stacked upside down, minor imperfections in the die may encroach upon the allowable discrepancies in stacked cores.

Burr control is necessary only to the extent that it removes the objectionable characteristics of burring. The most frequent causes of burr are die clearance, misalignment, taper, wear, and to some extent, material. Some material, due to either analysis or aging, will cause more burr on one run than on another, when all other factors governing burr are identical. Burring due to stock condition rarely reaches the objectionable stage on that factor alone.

There are other factors involved. Stock for lamination use is usually mild steel that tends to draw rather than shear. It is this tendency that helps produce the burr. The die clearance should be such as to minimize this condition. When an even burr (or no burr) is thrown over the entire sheared periphery of the lamination, it is definite

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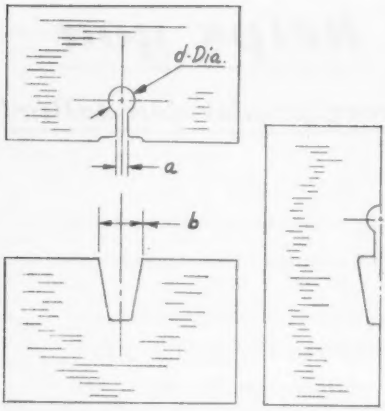


Fig. 5-A (above). Dimension "a" will have to be produced by the sides of the grinding wheel—a bad practice. Diameter "d" will be difficult to produce and hold. Unless all dimensions are produced exactly as specified, assembly will be very difficult.

proof that die clearance was properly determined, and the die was properly constructed.

However, one other factor is invloved: a practice of changing material gauge after the die has been properly made. A die designed to work No. 22 gauge stock will burr badly on No. 26 gauge stock, whereas a die designed for No. 26 gauge will not burr objectionably on No. 22 gauge stock.

This again brings lamination design to the foreground and suggests that, if more than one gauge of material is to be run on the same die, the thinner gauge lamination should be the determining factor for die design and construction; and the heavier gauge should be the determining factor in press selection. It should be a practice of the lamination designers to keep the die designers informed about the range of gauge to be used in producing the required lamination.

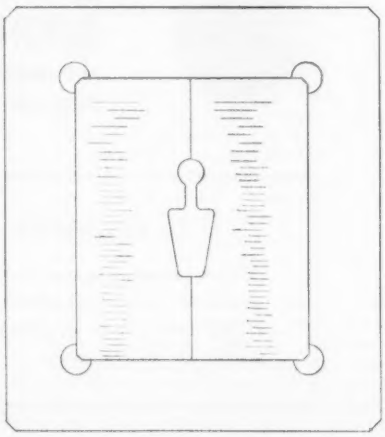
If burr appears only in spots on the lamination, the cause may be due to several factors. Punch and die may not be properly centered, thereby allowing more clearance on one portion of the die than upon the other. This may be caused by improper construction, improperly anchored or aligned guide posts or bushings, too much clearance between post and bushing, lack of parallelism between plane of ram face and plane of bolster face, or too great a bolster opening for job being run.

There are many other causes for burr, and, in nearly every instance, they are traceable to bad design more often than to bad construction or assembly and are due to the fact that insufficient prior consideration was given the problem on hand. Both the lamination and the die can be laid out more economically on paper in the drafting room than on metal in the toolroom. Many times, machine accuracy is misconstrued by designers. Certain symmetrical profiles can be very accurately reproduced on toolroom machinery; these fall in the general classification of circles, rectangles, or squares.

It must be borne in mind that, though the lamination design is symmetrical, its symmetry may not lie within the contouring limits of the available toolroom machinery. Much of the symmetry may

(CONTINUED ON PAGE 78)

Fig. 6. A redesign of Figure 5 which greatly minimizes grinding difficulties. These segments (Figure 5-A) can easily be ground to exact dimensions and also are adaptable to corrective fitting and grinding.



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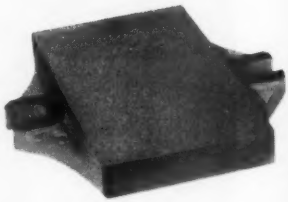

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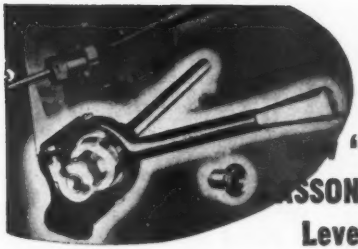

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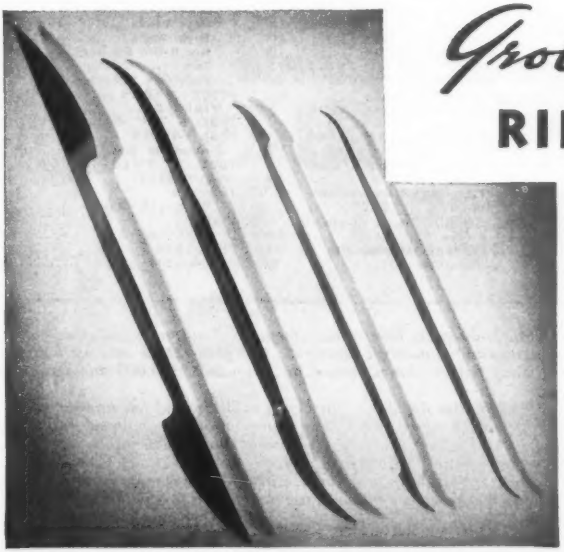

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The two planes, in close formation with five other Navy craft, collided and fell into the heavily populated and industrial area of Detroit's East Side. The explosion of one plane set fire to four homes; the other crashed through the Putnam grinding department roof. Both pilots were killed. Miraculously, only two Putnam workers were slightly injured.

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Aluminum Goes To Press

*Part II**

Forming Aluminum Sheet

Aside from drawing, there are many forming operations encountered in the production of aluminum parts. Among these are: hand and power brake forming, stretch forming, bench folding, press forming, straight rolling, bead rolling, embossing, edging, etc. Successful results from these operations depend upon careful planning in the design of tools and in the selection of the proper aluminum alloy.

Although very little spring-back will be encountered in the use of annealed sheet, it will be experienced when forming strain-hardened or heat-treated material. The exact amount of spring-back is difficult to compute; therefore the tools should be provided with adjustments for over-bending unless preliminary experiments are undertaken to determine the job's spring-back behavior.

by E. V. Sharpnack
Technical Advisor
Reynolds Metals Company
Richmond, Virginia

Straight bending in a V-die is perhaps the most common of all sheet forming. Table I has been prepared to indicate the recommended minimum inside bend radii for 90° cold bending of the commonly used aluminum sheet alloys, while Table II shows the non-heat-treated aluminum sheet alloys that can be safely cold formed 180° for providing rounded and/or reinforced edges.

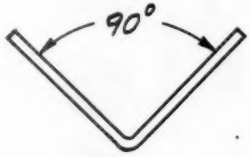
Successful bead-rolling, embossing, and edging depend to a great extent upon the elongation characteristic of the alloy selected. Naturally, when such operations are performed near the unconfined edge of a sheet, less severe elongation is encountered. Generous tool radii should always be used. Beads in flat surfaces should not end too abruptly, but gradually. Advantage should be taken to draw metal from as much of the surrounding area as possible when beading or embossing. It is often necessary to add a coining operation where very small radii or no radii is a "must".

In the edging of holes, the height of the edge is determined by the ability of the material to stretch successfully without cracking. Best success will be encountered with the use of annealed sheet, taking advantage of its higher elongation properties. A clean-cut sheared edge on the blanked hole helps appreciably, also a generous forming radii. Table III is presented as a guide in obtaining good results on edged holes in annealed sheet.

Blanking and Piercing Aluminum Sheet

A suggested method of protecting the fine surface of aluminum sheet during these operations has already been mentioned under the heading "Handling Aluminum Sheet". For blanking, the punch should be of annealed tool steel and the die of hardened tool steel. Surfaces of both should be ground. Press loads may be reduced, if necessary, by angle-grinding the face of the punch or die. If the blank itself is to be kept flat, the angle-grinding must be done on the die. If the

TABLE I (right)
90° Cold Bending
Minimum inside Radii



Key to Symbols:

A = 2S	D = 24S
B = 3S	E = 52S
C = 4S	F = 61S

G = R301

Note: For gauges not shown, use the data for the next higher gauge given in the table.

*Part I—Tool & Die Journal, February 1948.

Temper	Gauge	No Radius	1/32" R.	1/16" R.	3/32" R.	1/8" R.	3/16" R.	1/4" R.	3/8" R.	1/2" R.	3/4" R.	1" R.	1 1/4" R.	1 1/2" R.
O	.016"	ABCDEFG												
O	.032"	ABCDEFG												
O	.064"	ABCDEFG												
O	1/8"	ABCDEFG												
O	3/16"	ABE			CDFG									
O	1/4"	ABE						CEFG						
1/4H	.016"	ABCE												
1/4H	.032"	ABCE												
1/4H	.064"	ABE	C											
1/4H	1/8"	AB		E	C									
1/4H	3/16"			A	B	E	C							
1/4H	1/4"					A	B	E	C					
1/2H/W	.016"	ABCEF	G											
1/2H/W	.032"	ABE	CF		G									
1/2H/W	.064"	AB		E	CF		G							
1/2H/W	1/8"	A		B		E	CF		G					
1/2H/W	3/16"				A	B		E	CF		G			
1/2H/W	1/4"						A	B		E	CF		G	
3/4H	.016"	ABE	C											
3/4H	.032"	A	B	E	C									
3/4H	.064"			A	B	E	C							
3/4H	1/8"					A	B	E	C					
3/4H	3/16"							A	B	E	C			
3/4H	1/4"									A	B	E	C	
H/T	.016"	AF	BE	CDG										
H/T	.032"		AF		BE	CDG								
H/T	.064"				AF		BE	CDG						
H/T	1/8"						AF		BE	CDG				
H/T	3/16"								AF		BE	CDG		CDG
H/T	1/4"										AF		BE	

TABLE II
180° Cold Bending

Temper	Gauge	Alloy
O	.016"	ABCE
O	.032"	ABCE
O	.064"	ABCE
O	⅛"	ABCE
O	3/16"	ABCE
O	¼"	ABCE
¼H	.016"	ABCE
¼H	.032"	ABC
¼H	.064"	ABC
¼H	⅛"	ABC
¼H	3/16"	AB
¼H	¼"	AB
½H	.016"	AB
½H	.032"	AB
½H	.064"	AB
½H	⅛"	AB
½H	3/16"	A
½H	¼"	A

Key to Symbols:

A = 2S C = 4S
B = 3S E = 52S

Note: Gauges not tabulated have equal workability if within the maximum limits indicated.

material being blanked is to be kept flat, the angle-grinding should be done on the punch. Blanking tools should preferably be mounted on guide-pin die sets.

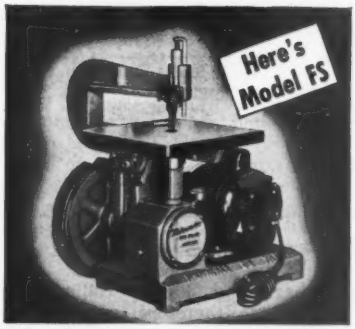
Since there are a considerable number of aluminum sheet alloys produced in various tempers, and since in actual practice it has been noted that clearances can be evaluated very closely in relation to the shear strength of the material, the simplest method of determining punch and die clearances is to refer to the shearing strength of the sheet under consideration and establish the clearances from Table IV.

The shearing edges of the blanking

TABLE III
Hole-Edging Chart

D = d × constant

Alloy	t	Constant
2S-O	.013" to .019"	1.15
	.020" to .031"	1.20
	.032" to .050"	1.25
	.051" and up	1.30
3S-O	.013" to .031"	1.20
	.032" to .050"	1.23
	.051" and up	1.25
4S-O	.013" to .019"	1.14
	.020" to .031"	1.16
	.032" and up	1.18
24S-O	.013" to .019"	1.10
	.020" to .050"	1.11
	.051" and up	1.12
52S-O	.013" to .019"	1.15
	.020" to .031"	1.18
	.032" and up	1.20
61S-O	.013" to .019"	1.14
	.020" to .050"	1.15
	.051" to .127"	1.16
	.128" and up	1.18
R301-O	.013" to .019"	1.12
	.020" to .050"	1.14
	.051" and up	1.16



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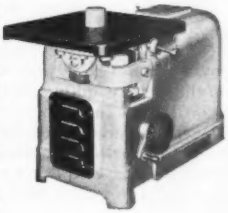

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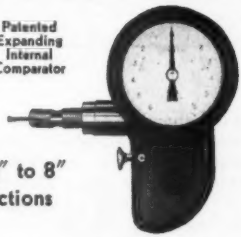

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Shear Strength	Die Size
Up to 10,000	Punch Size + .12t
10,000 to 12,000	Punch Size + .13t
12,000 to 15,000	Punch Size + .14t
15,000 to 18,000	Punch Size + .15t
18,000 to 24,000	Punch Size + .16t
24,000 to 30,000	Punch Size + .17t
30,000 and Up	Punch Size + .18t

TABLE IV Blanking Tool Clearances

tool should be kept well lubricated as well as the aluminum sheet. The sheet may be fed through felt rollers or pads well saturated with the proper lubricant. A sheet stock having low shearing strength should require a heavier lubricant than one of higher strength. There are many satisfactory cutting lubricants available for use in blanking and piercing aluminum.

What has been stated in regard to blanking procedure also applies to the piercing of aluminum with the exception of punch and die clearances. Clearances for piercing or perforating should be kept to an absolute minimum, a suggested size for the die being the punch diameter plus 5% of the metal thickness. Sufficient die relief should be provided for a quick "get-away" of the slugs. Attempts to pierce holes of a size or diameter less than the metal thickness will usually cause excessive punch breakage.

Work-Hardening of Aluminum

Aluminum sheet of the non-heat-treatable types that is obtained in the annealed condition, commonly designated by the symbol "O", has been relieved of strain-hardening due to rolling. Annealed metal, therefore, supplies the most ductility and is generally used for drawn shells and difficult forming jobs. Successive operations which subject the metal to tension or compression in the same areas will increase the physical properties and reduce the ductility. For instance, in starting the drawing of a shell with annealed stock, each successive drawing operation will strain-harden the areas that are subjected to plastic deformation. This automatically reduces the extent to which it can be further worked unless cautious procedure is used. Each such successive operation can be calculated to increase the physical properties and reduce the ductility to approximately the values in Table V.

Quite often, where a multiplicity of operations are required to produce a part, intermediate annealing is employed; however, expert advice should be sought before doing this, as there is a variation in the procedure as used for different aluminum alloys. In some cases excessive work-hardening will occur in a localized area and it may be undesirable to anneal the entire part. In such an in-

TABLE V Work-Hardening Chart

Starting Alloy	After One Operation	After Two Operations	After Three Operations	After Four Operations
2S-O	⅛H	¼H	½H	½–¾H
3S-O	¼H	½–¾H	¾H	¾H
4S-O	¼–½H	½–¾H	¾H	H
52S-O	¼–½H	½–¾H	H	H

stance the application of heat by means of a torch will enable the immediate performance of a successive operation with satisfactory results; however, when this method is used, extreme care must be employed to avoid over-heating.

Summary

While this article has pointed out certain precautions to be taken in the fabrication of aluminum parts and has stressed the necessity for care and preciseness in the handling of aluminum through the various plant operations, it is by no means the desire of the author to create the idea that aluminum fabrication is difficult to perform. On the contrary, it is directly the opposite. The data presented are intended to assist fabricators in overcoming or avoiding various problems or difficulties that they might otherwise have encountered, and to suggest methods tending toward the improvement of their workmanship. Once the "know-how" and experience in handling aluminum are gained, aluminum becomes the preferred metal to those who initiate its use in their product; progress is made and consumer satisfaction is assured.

Swiss Jig Borer Distribution

A new distributing and sales organization has been announced for Swiss jig boring machines and optical measuring instruments in USA, as manufactured by Henry Hauser S.A., Bienne, Switzerland. President of the new company, Hauser Machine Tool Corporation of Manhasset, New York, is Carl Hirschman, Bienne, Switzerland. Henry Hauser S.A., Bienne, are celebrating their 50th anniversary as builders of high precision machinery this year.

New Detroit Die Set Distribution

The Ameco Company, 9113 Kinsman Road, Cleveland, Ohio, has been appointed northeastern Ohio representative for Detroit Die Set Corp. of Detroit, Mich. The appointment was made to facilitate distribution of the company's die sets and die makers' supplies in the Ohio territory.

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(CONTINUED FROM PAGE 64)

have to be produced by hand filing, grinding, and honing. Certain symmetries can best be incorporated or produced in solid pieces, others are best done by segmenting. The die designer must determine the construction of the die and this construction should lie well within the limitations of the toolroom machines, assembly tolerances, and permissible maintenance. The lamination designer should appreciate the problems his design presents, and should remember that the lamination is to be produced by a die which, in turn, must be built with available equipment. Therefore he should hold his artistic talents well within the bounds of practicality.

Segmented or Solid Constructions

It has been pointed out that available toolroom equipment is the determining factor in the production of dies. As with all production problems, it's impossible to put the finger on any one of them and say that it has only one possible solution. Certainly a die designed to produce about 50,000,000 pieces will bear greater consideration as to construction than one designed to turn out 50,000 pieces.

Good practice requires consistency in techniques. Machining practices for producing solid-type dies are different from the practices followed in producing segmented constructions. Segmented construction should be used when the accuracy of machining can be incorporated into the segments in such manner that the full benefit from this machined accuracy can be maintained in assembly, or when accuracy can be improved through assembly. Segmented construction should also be used when one portion of the die is highly fragile and is likely to deteriorate before the balance of the die. This allows for easy replacements.

Segmented construction may even be feasible when the die will not be hardened. It is easier and faster to mill, grind and assemble four pieces of bar stock to form an angular opening in a die, than it is to hog this same opening out of a solid piece of metal and finish it by hand. The same is often true for duplicate die portions having a symmetry that can be machined readily. Many times a long piece of flat stock can be planed or milled and then cut and assembled to form the desired contour much easier than the same contour can be created in the solid piece by machining and hand filing.

Segmented construction requires greater machining accuracy than does solid construction. It requires more machines and a greater variety of machines. It requires faster machining. It permits repairs and replacements of broken or chipped sections. It demands greater and consistent forethought. It demands adherence to specified dimensions. On certain dies, construction by segments is advantageous even when the initial die cost is greater by 50 percent than were the die made from a solid piece. On other dies, construction by segments may reduce cost by 50 to 75 percent because of the ease with which machining can be done and the accuracy to which the die can be constructed.

Segmented construction of both punch and die, or portions thereof, sometimes may be the only possible solution. The male portion of the die can often be made solid or be composed of inserts, the inserts being individual whole units. It is mostly the female portion of the die that requires construction by segmenting. The segments must always be large enough to permit fastening, and small enough to be advantageous over solid construction. The lines along which the segments are cut must be such as to avoid assembly by angles or the forming of feather edges. These design precautions are illustrated by Figures 1 to 4.

Segments should, for best results, be held together by shrink rings or wedged into solid retainers before mounting to die shoe. When so held the segments need not be doweled unless they constitute large sections; then it may not be necessary to use shrinking methods. Sections sufficiently large to hold both screws and dowels need only to be tapped into place as they are fastened to die shoe. Dowel holes should be enough larger than the dowels so that soft plugs, driven into these holes, can be drilled and reamed for doweling after the segments have been securely bolted

into place. True, spreading or creeping may occur. To prevent this, an external retainer form may be applied.

Spreading is due to mechanically faulty construction; creeping is due to material instability. Where slugs will pass through the die, a shrink ring must be used. Where slugs do not pass through the die but are ejected at each stroke, the outward pressure caused by each blank at any one time is almost negligible when compared to other strains present.

Mechanical soundness is very important in segmented constructions. If a segment is loose enough to be moved around when in place, there is no question about its moving in use; it will move or shift out of position. The same good sense must be applied to producing segments as would be applied to solid construction, only it must be applied more often.

Feather edges and thin sections, though backed up by another member, are still feather edges and thin sections. If a segment won't stand up as an item by itself, it won't stand up after it's assembled.

For producing lamination by segmenting, much auxiliary tooling is required in the form of jigs and fixtures for holding and positioning the segments during the various machining operations. Each operation requires its own fixtures and as the operations approach the final grinding stage, the fixtures must be designed to permit finishing within the degree of accuracy required. This accuracy may be very great, especially for rotor or stator slots where angular location, concentricity between slots and gap or rotor diameters must be maintained. Also, the fixtures must be of such quality and universality that new ones do not have to be made each time a segmented die is to be constructed.

The toolroom measuring and inspection equipment must be extremely accurate and sensitive. In measuring the dimensions of one segment, errors must be readable to such small increments that when all segments are assembled the accumulated error will not exceed the over-all tolerances allowed for the finished die.

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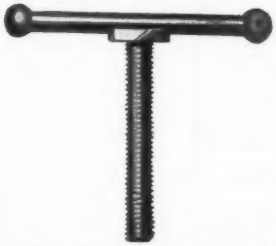

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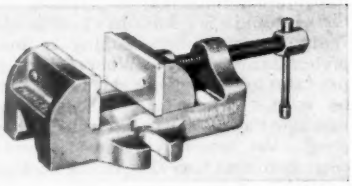

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New Company Formed

A new company, The Wickman Manufacturing Company, has recently been organized to take over from the Wickman Corporation all activities in connection with the manufacture and sale of diamond wheels and related products. Headquarters of the new company are at the same location, 15535 Woodrow Wilson Avenue, Detroit 3, Michigan, and the personnel will remain the same. The products which the company will produce and sell include a full line of resinoid-bonded diamond wheels, the Wickman-Neven lines of steel-bonded diamond wheels and chip breaker diamond wheels, diamond drills and hones, the Wickman-Neven bench grinder, and the Wickman-Neven universal tool grinder.

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New Flexible Head Welding and Cutting Torch

Users of oxyacetylene hand torch equipment will be interested to hear of the new welding and cutting torch introduced recently by The Hamilton Tool Company, Hamilton, Ohio. This new "Cristorch" will cut metal of thicknesses from $\frac{1}{32}$" to 4", and will cut holes and circles from $\frac{3}{8}$" to 30" in diameter with an accuracy to within $\frac{1}{64}$". An unusual feature which greatly increases its usefulness is its flexible head which can be revolved through an arc of 180°. This enables it to reach otherwise inaccessible spots. It can cut countersunk holes and bevels one or both sides of a straight cut in a single operation. A time-saving feature which has been incorporated into the torch is an exclusive side opening tip lock-nut for speedy insertion or removal of tips. One turn of this nut releases or tightens the tip which is inserted and withdrawn through an accurately milled side opening of the nut. A bulletin (C-48) has been prepared by the manufacturer, explaining the "Cristorch" in detail. Copies are available from The Hamilton Tool Co., Dept. 61, Hamilton, Ohio. **Inform-A-Gram Key No. D59.**

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A new line of high speed steels is now in production at the Latrobe Electric Steel Company and it is being offered for sale at lower prices than those charged for the standard tungsten and molybdenum - tungsten high speed steels. Known as the Electrite MV high speed steel group, this line is distinguished by its chromium, molybdenum and vanadium content, with no tungsten present in the steels. These steels are particularly suitable for applications which do not require the full properties of the more common tungsten and molybdenum-tungsten high speed steels, such as small drills and reamers, thread chasers, taps, pipe taps, wood-working knives and cutters.

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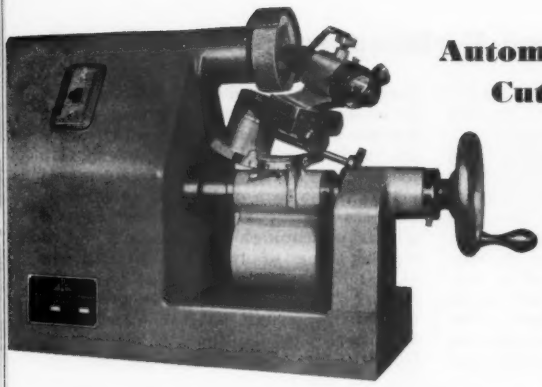
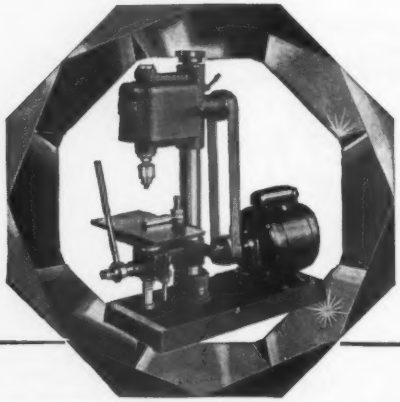


Automatic Clearance Cutter Grinder

New economy in angle, ball and radius cutters ground from prepared halved blanks is now possible with the new Pierce G-A grinder with automatic clearance, recently announced by the Pierce Machine Tool Co., Chicago. The automatic clearance feature is foolproof and therefore the machine requires only reasonably skilled operators. All varieties of cutters may be ground from blanks in as little as 5 minutes, and may be resharpened in as little as 1 minute. The resulting single-lip cutters demonstrate improved efficiency in diameters to .375". They are free cutting and will produce a fine finish. These single-lip tools are widely accepted in the engraving and routing trade and are becoming more and more popular for mold and die work. They are particularly suitable in small diameters which permit very high speed operation—such as deep narrow grooves with desired draft and special radius work.

The Pierce G-A grinder offers fast, accurate and time-saving grinding. The cutting edge with the desired predetermined clearance is ground in one operation. For detailed information write to Pierce Machine Tool Co., Dept. 26, 625 W. Jackson Blvd., Chicago 6, Ill., or circle **Inform-A-Gram Key No. D66.**



PRECISION INSTRUMENT TAPPER

THE HAMILTON SUPER-SENSITIVE TAPPING MACHINE

Designed to meet the most exacting requirements of precision manufacturers. Patented power transmission permits centering of tap without cutting, and tapping to the very bottom of blind holes without tap breakage. Capacity from the smallest and finest tap to 10-32 inclusive. Silent and clean in operation. Our Bulletin T-47 gives full specifications. Write for it today!

THE Hamilton TOOL COMPANY

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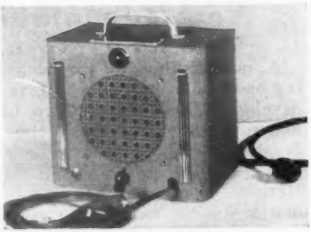
Duplicating the Mealey Way



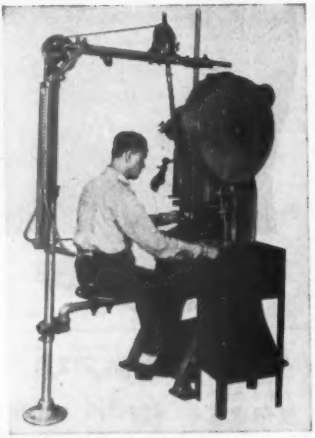
A faster, more accurate way of duplicating has been developed lately—known as the Mealey Method. The Mealey Method for die making consists mainly of two pieces of equipment, the Signatron Follower and the Signa-Kote. Signa-Kote is an electro-conductive coating applied to master models made of wood, plaster compositions, cast resins and other non-conductive materials. The Signatron Follower, pictured at right, is an adaptation of a vacuum tube, an auto signal generator, an amplifier and a loud speaker. Briefly, the Mealey Method is as follows: the plaster master model is painted with the electrically conductive "Signa-Kote" enabling the surface to serve as part of the circuit, which is completed by contact of the tracer stylus on the model. The operator down-feeds the cutter into the work until he hears the contact warning from the loudspeaker of the Signatron Follower. This warns him that the stylus has contacted the master surface, whereupon he immediately stops the cutting feed, and resumes the patterning in a different place. By using a hookup of two Signatron Followers, milling operations in two directions may be electronically controlled. The operating mechanism of the Follower is a simple one—employing an on-and-off switch, a tone control dial for adjusting the pitch and intensity of the signal and an extension cord for plugging into any 110 volt, AC, 60 cycle outlet. A telephone-type plug-in jack in the end of the housing enables the operator to employ the use of a set of headphones if he is working under conditions of an extremely high shop noise. Write to the Mealey Grease & Oil Co., Dept. 30, 2945 East 83rd St., Cleveland 4, Ohio, or circle **Inform-A-Gram Key No. D72.**

You can make your punch presses

positively safe

with **POSSONS**

POSITIVE SAFETY DEVICES



The new Red Arrow Pull-Out Multiplier makes "Possons Positive Safety Device" the most efficient, dependable and practical means yet found to make punch press operation safe!

WRITE FOR COMPLETE CATALOG TODAY

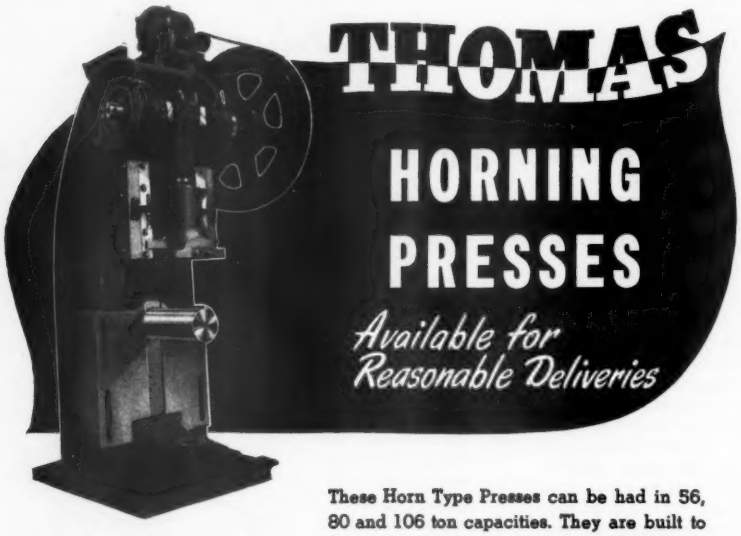
The **POSITIVE SAFETY MFG. CO.**

4406 Perkins Ave. Cleveland, Ohio

Engineering Service Upon Request

New Technique for Notching Operations

A new method of performing notching operations on a punch press has been developed that is estimated to save 2 hours per 8-hour running time of each press. This method was developed at The Glenn L. Martin Company by Herbert A. Stran. Setup time is saved and also time is saved in running production parts. The method employs an adapter plate and safety guard which assure accurate work and protect the operator's fingers. The adapter plate is fastened to the bolster plate with four dowel pins and four set screws, thus assuring the operator accuracy in his work. The plates that were in use prior to the development of these new plates were impractical in that they had to be wired at one end to keep from shifting and spoiling a great deal of work. The safety guard is of 4130 steel, slotted, with a flange bent under and bolted to the adapter plate. This guard provides a clear and unobstructed vision of the entire operation, eliminates two-hand control, and speeds up the production run of the parts. Further details may be had by writing The Glenn L. Martin Co., Dept. 23, Baltimore 3, Md. **Inform-A-Gram Key No. D58.**



Send for Bulletin 212 A

These Horn Type Presses can be had in 56, 80 and 106 ton capacities. They are built to the same high standards and specifications of our well-known Inclinable Presses. Special attachments may be installed as desired.

P-4

THOMAS
MACHINE MANUFACTURING COMPANY
PITTSBURGH, 33, PA.

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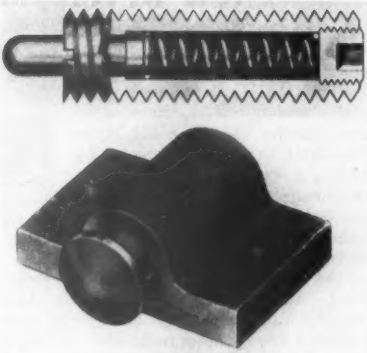
Vlier Unitized Spring Plungers and Stops

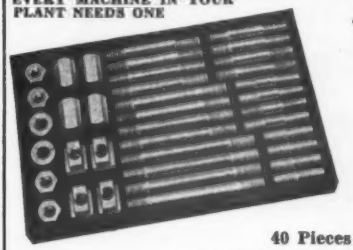


When accurate spring tension action is required for holding and positioning work on die and jig fixtures, machinists will welcome the new improved spring plungers and spring stops recently developed by Vlier Manufacturing Company. These plungers are "unitized" and ready for use in any modern machine shop. They may also be used to great advantage on other tooling applications, or on finished products. The Vlier spring plunger shown in the drawing at right (above) is available in standard sizes with end spring pressures of five to forty-two pounds. The rounded plunger nose permits easy insertion of the workpiece and the spring pressure maintains a tight, firm contact. The plunger ends, which telescope within the treaded body, are specially hardened, and the plunger is rust-proofed and individually boxed. The Vlier spring stops shown in the photograph at right (bottom) were designed to serve the same purpose as the plungers in cases where no wall sections are available for threaded mountings. They provide an end pressure of fourteen pounds, and are rust-proofed finished. Hours of setup time wasted in devising and building temporary or makeshift tension holders are eliminated with these Vlier spring plungers. Further details from Vlier Manufacturing Co., Dept. 51, 4552 Beverly Blvd., Los Angeles 4, Calif., or circle our postage-free Inform-A-Gram Key No. D77.

Get Set for Quick Set-Up!

Handy **STUD AND NUT SET**

EVERY MACHINE IN YOUR PLANT NEEDS ONE



Saves You

Machine Hours

Man Hours

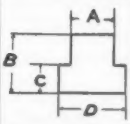
★

Cuts Costs and Pays for Itself

40 Pieces in Each Set

All Sets in Individual Cases

Specially designed T-slot nut will prevent damage to table slots caused by ordinary nuts.



Holes & Thread	A	B	C	D
½"—13 THD.	.555	¾"	11/32"	⅞"
⅝"—11 THD.	.675	1¼"	15/32"	1⅛"
¾"—10 THD.	.800	1⅜"	½"	1⅜"

Made of Quality Steel. Case Hardened and Chrome-Plated for Long Life. Class 3 Threads. Sets Sized to Provide Greater Rigidity in Clamping.

Prices

½" Set, $22.00

⅝" Set, $34.00

¾" Set, $28.00

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NOBLE & STANTON, INC.

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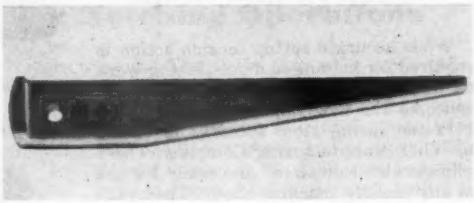
New Development in Drill Drifts



An important development has been made in Cleveland Twist Drill Company's drill drifts which makes them safer and handier than the old style. The drift has been improved by adding a shoulder, or flange, on the head end. This has proved to be less damaging to babbitt hammers and provides for a more direct, solid driving force to the enlarged end. Mushrooming is retarded because of the added metal at the head. The enlarged end prevents the drift from flying through the spindle slot—thereby eliminating the danger of someone being hit. Time is saved because it is removed from the spindle slot instead of having to be picked up from the floor or from the chip pan. Each drift has a hole in the end so that it may be chained to the machine or hung on a wall. Further details from Cleveland Twist Drill Co., 1242 East 49th St., Cleveland 3, Ohio, or circle our postage-free **Inform-A-Gram Key No. D79.**

Merz New-Tronic Height Gage. Furnished Complete with stand.

1. Speed
2. Accuracy
3. Flexibility

Merz NEW-TRONIC Gaging Equipment GIVES ALL THREE!

Merz *New-Tronic* equipment offers exceptional speed and accuracy on a wide range of gaging and sorting operations. Available in three popular types:

MERZ NEW-TRONIC HEIGHT GAGE: Furnished complete with stand, which is equipped with *fine-adjustment* for speed and convenience in operation. Gaging head mounting has standard A.G.D. lug for use with existing fixtures.

MERZ NEW-TRONIC BALL SORTING MACHINES: Two standard models. Model A handles balls from 3/32″ to 7/32″, in graduations of 1/32″. Model B handles sizes from 3/16″ to 1/2″, in graduations of 1/16″. Both make ten selections automatically, to an accuracy of 10, 20 or 50 millionths.

MERZ NEW-TRONIC COMPARATORS: For external measurements. Four models, with fixed or adjustable work-contact pressure. Each model is equipped with two magnification scales.

Write for complete information on these high-speed, cost-cutting Merz precision units.

MERZ ENGINEERING COMPANY • INDIANAPOLIS 7, INDIANA

New-Tronic Gaging and Sorting Equipment—New-Matic Measuring Machines—A.G.D. Standard and Special Gages—Tools and Special Machinery—Experimental Projects.

MERZ

Waltham Relocates Detroit Branch

The Waltham Grinding Wheel Co., Waltham, Mass., announces a relocation of the Detroit factory branch to 1433 East 8-Mile Road, Hazel Park, Michigan. Walter W. Hayden will head the Detroit branch. A complete stock of grinding wheels will be carried to serve the Detroit area.

New Company Formed

The Deca Company is a newly formed company located on Long Island for the distribution of an Electro-Automatic Tool Lifter —a money-saving attachment, easily and quickly installed on planing and shaping machines, for carbide tools. Deca Company's address is 4 North Avalon Rd., Great Neck, New York.

Outside Measurement Gage

The Ridermikrokator was developed by the Swedish Gage Company of America for checking out-of-roundness and diameters of cylindrical parts. As the measurements are carried out according to the three-point principle, the instrument can be used to good advantage for checking centerless-ground pieces. The frame is made of malleable cast iron, finished in a frosted enamel. The anvils and insulating grips are ground and lapped, and the anvils can be tipped with cemented carbide. As the angle between the anvils is 60°, the difference in radius between the setting gage and the work is measured.

Price and further details from Swedish Gage Co. of America, Dept. 85, 8900 Alpine Ave., Detroit 4, Mich. **Inform-A-Gram Key No. D74.**

★ ★ ★

Cluster Type Dressing Tool

Unusually high performance on straight dressing for production grinding is possible with a new cluster type dressing tool. Twenty small diamonds of long and narrow form are

symmetrically inserted in a matrix and arranged in two circles of ten diamonds each. Clipper Diamond Tool Co., Inc., Dept. 35, 21 West 46th St., New York City, N. Y. **Inform-A-Gram Key No. D62.**

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PRODUCE MACHINABLE WELDS ON CAST IRON WITH 100% PURE NICKEL DEPOSITS

1 Have *insulation coatings*, preventing side-arcing.

2 Smooth spatter-free arc action, AC-DC.

3 Emit no injurious gases.

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5 Give soft, ductile, homogeneous and porous-free weld deposits.

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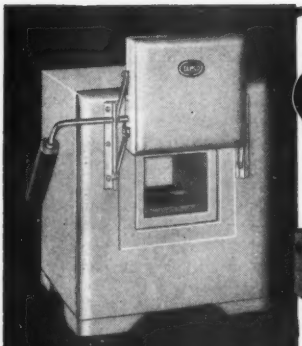


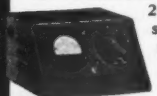
New improved design welded steel body—4½" dual insulation—uplifting counterbalanced door—heavy duty element embedded in all four sides of heating chamber.

TEMCO *It's new*

SERIES 1600 ELECTRIC FURNACE

FOR HEAT TREATING TOOLS, DIES, PARTS AND GENERAL LABORATORY WORK

New fast-heating sturdy TEMCO model built for continuous use to 1750°F., intermittent to 2000°F. Supplied with either 500 series TEMCOMETER stepless temperature controller and indicator (illustrated) or with VERITRON electronic controlling pyrometer.



MODEL	CHAMBER W" H" D"	VOLTS 50/60 CY.	WITH TEMCOMETER	WITH VERITRON
1625	5x4½x9	115	$140.00	$242.50
1620	5x4½x9	230	142.50	242.50
1635	5x4½x13½	115	167.50	260.00
1630	5x4½x13½	230	170.00	260.00

Write for literature and dealer's name.

THERMO ELECTRIC MANUFACTURING CO.

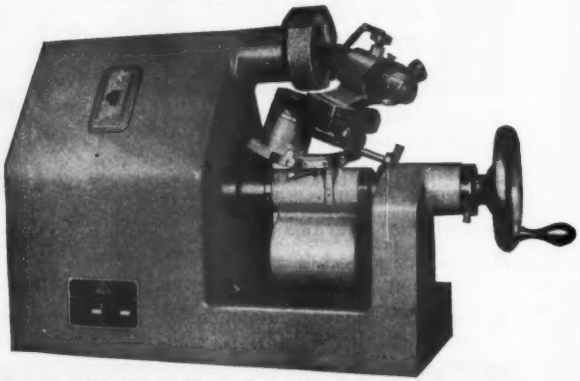
474-8 W. Locust St., Dubuque, Iowa

Introducing the NEW **PIERCE G-A**

AUTOMATIC CLEARANCE ENGRAVING CUTTER GRINDER

saves up to 300% in SHARPENING TIME

Unit-type spindle • Fully enclosed drive



You will save time, money and increase production with cutters ground on the NEW PIERCE G-A automatic clearance grinder; absolutely no estimating for angle of form or angle of clearance which is predetermined by one simple setting, and may vary from 0 to 30 degrees, as required. A wide variety can be ground including ball, cone, radius, dovetail or bottom cutters. The G-A is a perfect companion to the precision PIERCE R-2 Engraver. PIERCE high speed cutter blanks (halved) will produce better cutters, longer life, and lower costs. The G-A GRINDER can be obtained with floor stand.

Pierce Machine Tool Co. • **617 W. Jackson Blvd.** • **Chicago 6, Illinois**

Division of the PIERCE WRAPPING MACHINE COMPANY

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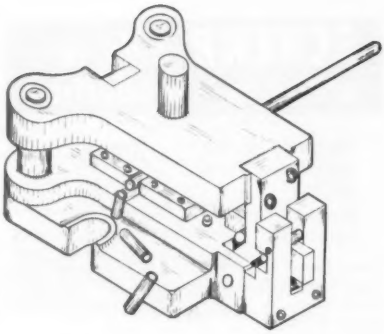
Tube-Cutting Device



A double-action die for straight cutting of tubing into lengths, on a power punch press, has been developed by Vogel Tool and Die Corporation. This Arc-Fit Tube Shear can cut the tubing at any angle from 45° to 90° to the horizontal center line. This is accomplished by the one-two action of a shear blade operating horizontally and a guillotine blade operating vertically so that a single stroke of the press will give one length of tubing without burr and without deformation. The cutting speed, then, depends directly upon how fast the press will operate. The die-set will interchangeably accommodate various sizes of cutting blades and die-block inserts for cutting different sizes of tubing at a specified angle. The blades and inserts are quickly and easily removed for sharpening and are so constructed and installed that an average of twenty-five sharpenings can be made before replacement is necessary. Since an average of 100,000 to 250,000 cuts can be made with each sharpening, maintenance cost is, of course, held to a minimum. The unit comes equipped with either an automatic stop or an automatic feed for cutting short lengths—depending upon the type of work. Further details from Vogel Tool & Die Corp., Dept. 46, 2527 Moffat St., Chicago 47, Ill., or circle Inform-A-Gram Key No. D75.

CUT MILLING COSTS with KEMPSMITH STANDARD ATTACHMENTS

CIRCULAR TABLE

Can Be Used on ANY Milling Machine

A Kempsmith Circular Table is a precision tool. Handles a large variety of jobs . . . milling circles, segments of circles, large cams and irregular contours. Ideal for gear cutting and high-speed continuous milling. Power feed and indexing attachment optional. Ask for Bulletin No. 106.

Kempsmith Standard Attachments broaden the scope of your milling machine . . . lower capital investment . . . save in set-up time.

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KEMPSMITH ARBORS in all popular sizes or types. Adaptable to ANY make of milling machine with standardized spindle.

KEMPSMITH

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SEE ADVERTISERS INDEX, PAGE 67, FOR KEY NUMBERS

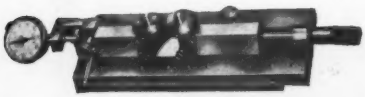
SCHERR *aids to precision – production*

Control the Job From Start to Finish with the WILDER Model A PROJECTOR

New horizontal type for production inspection just out.

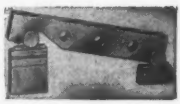
Throws a magnified shadow image of the part under inspection against an enlarged drawing of part. Magnifications available, 10x to 200x. Horizontal work table for flat work. Center support and micrometer cross slides for checking forming tools, screw threads, hobs, etc. Eliminates all errors due to "feel". May be speedily operated, with little or no experience. Prevents costly errors and insures initial correctness from the start of a production run. THIS COMPARATOR can be equipped with a new circular type of Surface Illuminator. Base price, $350.

A positive check on gear accuracy . . . the SCHERR GEAR TESTER



When placed on the work table of the Wilder Micro Projector, an enlarged image of the two meshing gears is thrown on the screen. Also valuable used independently, checking center distance, pitch line run-out and various gear errors, shown on dial indicator in .0005" as gears are rotated.

Now — every toolmaker can own a SINE BAR



Thoroughly normalized for undeviating accuracy. Two sizes —1"x⅝"x5", Price—$19.00 ground—$26.00 lapped, and 1x1¼"x5", Price — $26.50 ground—$36.50 lapped. Extremely low price makes this valuable tool available for the individual owner as well as in quantity for the toolroom.

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To Measure with Real Precision

GUARANTEED ACCURACIES

±.000002, .000004, and .000008 inches

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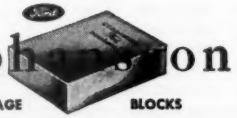

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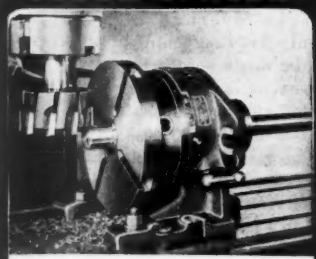
JOHANSSON DIVISION
3613 Schaefer Road • Dearborn, Mich., U. S. A.

SUPER-SPACER



For MILLING

The uses of the Super-Spacer in horizontal and vertical milling operations are unlimited. Here the Super-Spacer, mounted with a face plate and draw-in collet combination, shows its adaptability for milling bar stock. Investigate your present milling methods and see if your shop can't profit by the speed and accuracy of the Super-Spacer. For complete details write Dept. 85.

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HARTFORD 5, CONN.

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There is a M-T Fixture Clamp & Fixture Component to meet your most *exacting* requirements. Immediate delivery.

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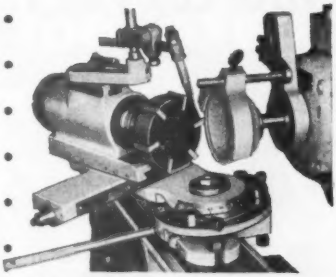
MORTON MACHINE WORKS
2423 Wolcott • Detroit 20, Mich.

For ACCURATE Radius GRINDING



• **Use this "K-O" FIXTURE**

Handles cutters ¼" to 10 dia. Grinds convex or concave radius. 180 swing. Adaptable to any tool and cutter grinder. *Mail coupon TODAY for complete details.*

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PALMGREN Rotary, Index MILLING TABLE
No. 83 Only $49.50

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It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring screw holes.

The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in 3/16" to 1" diameters.

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The author, one of the Plastics Industry's foremost authorities, devotes considerable text to the exceptionally important subject of cost estimating for plastics molds. It is a thoroughly practical and understandable volume of 22 chapters with more than 200 illustrations, including many drawings, tables and charts.

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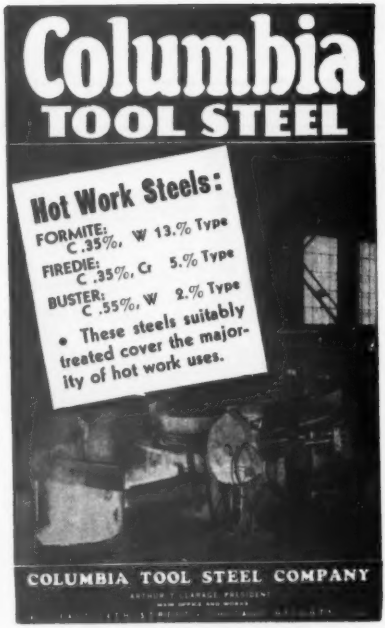
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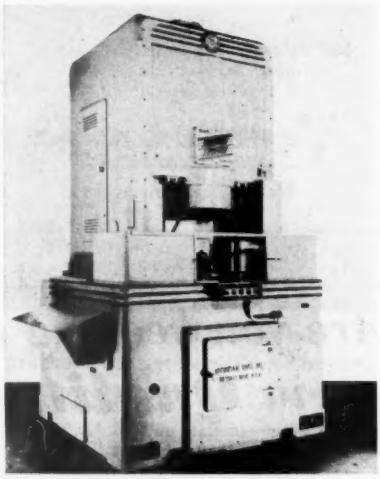
New and Larger External Shaper

Adding to their "Shear-Speed" line, the Michigan Tool Co. of Detroit announces a new and larger "Shear-Speed" external shaper, Model 18103, which is capable of cutting gears, toothed clutches and other external shapes up to 10" outside diameter and 2¾" thickness. Powered by a 30 hp electric motor, it cuts all the teeth in a gear simultaneously and is recommended for gears or involute splines from 5 pitch to 12 pitch. It will also cut straight sided splines, sliding clutches, ratchets, inverted splines and other external shapes. These can be cut individually or stacked and cut in multiple units where this is feasible.



Hydraulic actuated wedge pins provide instantaneous and positive locking of the head when it is lowered in cutting position by engaging a similar angular wedge surface on the two outer extremities of the head of the machine. Angle of the wedge surface on both the pins and the corresponding wedge surfaces on the head allow locking in the desired cutting position with only a simple adjustment of the head stop.

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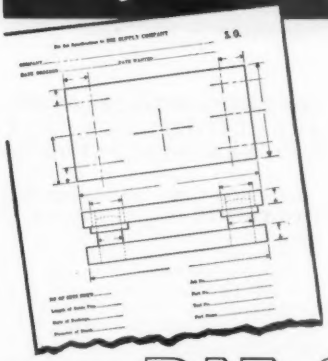

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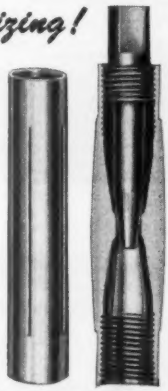
...without danger of galling or seizing!

The Flexolap barrel is made with a series of longitudinal slots milled "off-center" to permit sensitively flexible expansion up to 15% — or more — under pressure of the adjusting pin. This construction enables Flexolap to save valuable time and to lap rounder, straighter holes. For accurate precision take-up, as desired, to maintain size and compensate for wear on barrel . . . simply turn adjustment screw.

Illustrated at left is Set No. 1. Six sizes (3/16", 1/4", 5/16", 3/8", 7/16" and 1/2") with six brass and six steel barrels on wood stand, complete.....**$12.75**

Also available in sizes 7/32", 9/32", 11/32" 13/32", 15/32", 9/16" and 5/8". For lapping holes smaller than 3/16", use the *Midget Lap*. Fourteen sizes: .032, .036, .040, .046, .054, .070, .079, .090, .104, .120, .135, .155, .170. Trial assortment (14 laps).....**$1.50**



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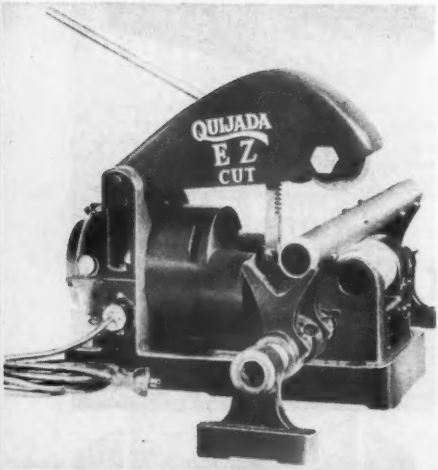
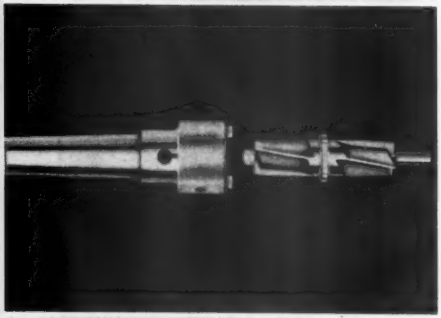
FEDERAL TOOL CORP., 401 N. LEAVITT ST., CHICAGO 12, U. S. A.

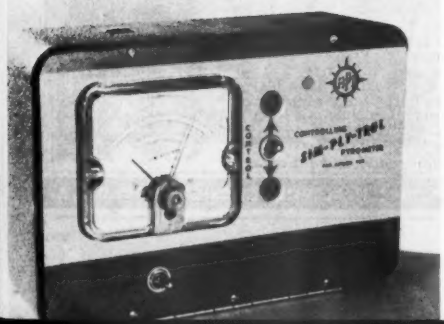
SEE ADVERTISERS INDEX, PAGE 67, FOR KEY NUMBERS

PROGRESS

NEW DEVELOPMENTS • IMPROVEMENTS • COST AND TIME SAVERS







CIRCLE KEY NUMBERS ON POSTAGE-FREE INFORM-A-GRAM INSERT FOR FURTHER INFORMATION

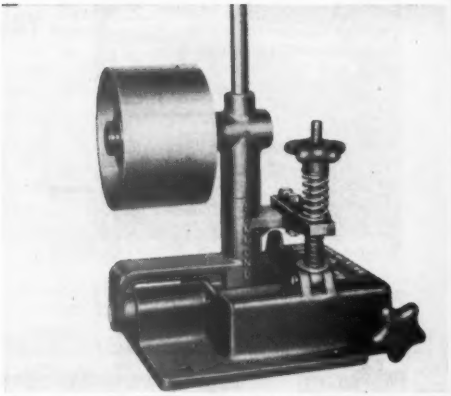
FOR FAST AND ACCURATE PIPE AND TUBE CUTTING, Quijada Tool Company, Inc., offers a new machine with many new automatic features. An automatic trip-switch starts cutting operations when the cutter wheel contacts the pipe and automatically stops when the cut is finished. A wholly new and different feature is the direct gear drive to the rollers, rather than to the cutter wheel. The machine is compact and easily portable, and will speedily and easily cut pipe diameters ranging from ⅜" to 4". Pipe is supported in adjustable roller yokes which permit free rotation. Powered by a ½ hp, 110 volt, universal type AC-DC motor, the machine is available at QUIJADA TOOL CO., INC., Dept. 50, 5474 Alhambra Ave., Los Angeles 32, Cal. **Inform-A-Gram Key No. A31.**

A COUNTERBORE WITH CUTTING EDGES AT TWO ENDS, instead of just one, is available now at Plan-O-Mill Corporation. Known as Plan-Co Double End Counterbore, the tool is being manufactured in a complete range of sizes in high speed steel, or with tungsten carbide inserts. Two types of holders—collet and sleeve—enable fast and easy tool replacement. The tool has twice the life of single end tools at only slightly more cost; a longer operation without time out for sharpening; and there is less need for high tool inventories since Plan-Co Counterbore does the work of two ordinary tools. PLAN-O-MILL Corp., Dept. 65, 1511 E. Eight Mile Rd., Hazel Park 20, Mich. **Inform-A-Gram Key No. A32.**

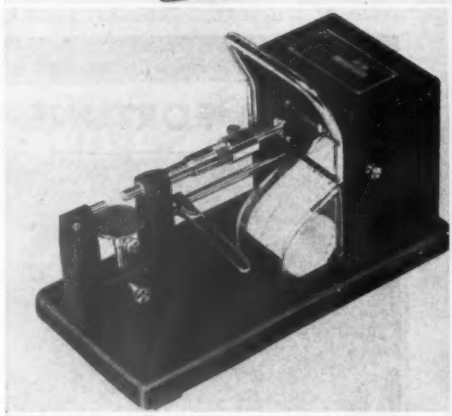
THE SIMPLYTROL INDICATING AND CONTROLLING PYROMETER, illustrated at left, is a thermocouple-type control for furnaces, ovens, kilns and processing machines. It uses the Micro-Contact indicators recently developed by Assembly Products, Inc. The high resistance millivoltmeter is equipped with platinum contacts that close when the pre-set temperature is reached. The positive contact assured by Micro-Contact locks with sufficient pressure to prevent chattering or floating. Every few seconds the circuit is interrupted to check on the control point. Simplytrols are supplied as package units and may be easily installed. ASSEMBLY PRODUCTS, INC., Dept. 51, Main & Bell Sts., Chagrin Falls, Ohio. **Inform-A-Gram Key No. A33.**

ON PARADE

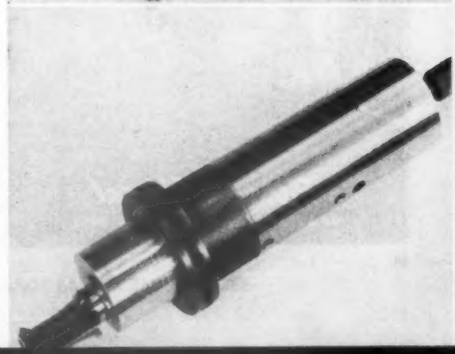
THE MODEL 6-B BENCH BACKSTAND, shown at right, converts grinding and polishing equipment into high production abrasive belt units, and is the newest addition to Hammond Machinery Builders' complete line of bench and floor-type backstands. Model 6-B is particularly suited to inconvenient and limited space installations. Its heavy cast iron base is drilled for convenient mounting. The 8" by 4½" face dynamically balanced aluminum pulley is mounted on sealed lifetime-lubricated precision ball bearings. There is a handy release lever for quick, easy changing of belts, and a spring-loaded belt tension adjustment operated by a sure-grip hand screw. Details and literature are available by writing HAMMOND MACHINERY BUILDERS, INC., Dept. GP-28, 1631 Douglas Ave., Kalamazoo, Mich. **Inform-A-Gram Key No. A34.**



THE AUTOMATIC DIMENSIONAL RECORDING GAGE, developed by Federal Products Corporation, incorporates a new system for quality control. Model 500 is a precision instrument for measuring small parts and simultaneously recording, in ink on a continuous tape, the deviation of the measured pieces from the specified dimension. The tape is ruled off in increments of thousandths and half thousandths of an inch, thus making it possible to obtain not only a rapid, accurate record of the dimensions of production parts, but to obtain a permanent record automatically. The operator, who need not be skilled, can tell at a glance how his workpiece dimensions are running and before the parts are produced he is warned which will not pass inspection. FEDERAL PRODUCTS CORP., Dept. 4, 1144 Eddy St., Providence 1, R. I. **Inform-A-Gram Key No. A35.**

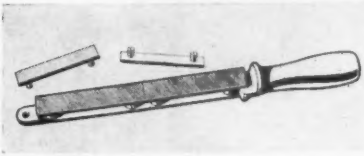


A NEW LINE OF AUTOMATIC RECESSING TOOL HOLDERS is in production at The Maxwell Company for use with machines having automatic feeds. In developing this new line, Maxwell has taken into consideration the increased feed at which machines are being operated today, and the desirability of reducing this feed for internal forming work. These tools are operated by a draw-bar having a telescopic adjustment for tool locations. Rapid set-ups are possible with these tool holders, and they assure a sturdy support for the circular form cutters of either high speed steel or carbide tipped which can be used. Available in a large range of sizes at THE MAXWELL CO., Dept. 42, 386 Broadway, Bedford, Ohio. **Inform-A-Gram Key No. A36.**



PROGRESS ON PARADE

NEW HAND FILES OF CEMENTED CARBIDE featuring ground teeth are announced by Severance Tool Industries, Inc. The file consists of a combination handle-holder on which two carbide segments are mounted. The flexibility of mounting—such as a coarse and a fine segment on the regular holder, or multiples on special holders—when combined with the precision of flatness obtainable by grinding, opens new fields of application to these broach-like carbide files. They will cut steels that no ordinary file will touch. The Carbide segments can be removed and re-



turned to Severance for regrinding. For more information write SEVERANCE TOOL INDUSTRIES, INC., Dept. 461, 730 Iowa St., Saginaw, Mich., or circle **Inform-A-Gram Key No. A3.**

BASE-LOCK TYPE CASE, a wooden type case recently announced by Wm. A. Force & Company, Inc., will undoubtedly prove to be a most useful item in shipping rooms, in

plants, or in shops. The case is 12½" square and has 49 compartments, each of which is indexed for speedy storage. The lid is held on firmly with strips of Base-Lock rubber base. The box is attractively stained and well made of rugged fibreboard construction for many years of service. For further details write WM. A. FORCE & CO., INC., Dept. 293, 220 Nichols Ave., Brooklyn 8, N. Y. **Inform-A-Gram Key No. A21.**

This is one of our storage sections. ***Strenes Metal*** castings have been made from these patterns.

Here are patterns for forming and drawing dies used by many of the largest sheet metal fabricators . . . manufacturers of appliances, automobiles, bicycles, blowers, caskets, implements, tractors, trucks, vaults, etc.

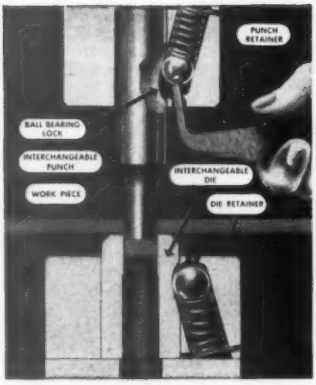
Here are also patterns for ***Strenes Metal*** castings employed as parts of equipment . . . bushings, melting pots, pump housings and impellers, lathe beds, machine bases and the like.

When you visit our plant, you'll probably be surprised at the volume of ***Strenes Metal*** castings we pour from day to day.

THE ADVANCE FOUNDRY CO.
DAYTON 3, OHIO

INTERCHANGEABLE PUNCHES and DIES

Quickly Inserted... Rigidly Held!



Allied's R-B Interchangeable Punches and Dies are quickly inserted — rigidly held for accurate, trouble-free punching in the metal-working and plastics industries. They are available from stock in standard round, oblong and square shapes of almost any required size. Specials of any size, shape or material are promptly furnished to your specifications . . . and delivery dates are dependable.

Large, illustrated R-B Catalog gives complete details, specifications. Write for it.

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Deep, hand-cut letters in special-formula steel—result of 90 years of die making—assure clean impressions and long service. Face of stamp is angled for extra strength. Ideal for parts and tool marking and numbering. Also made in reverse for marking molds and dies.

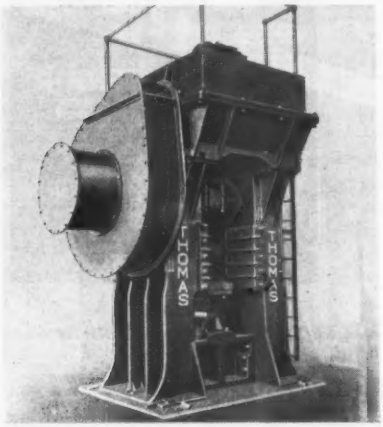
• *At mill supply houses*

HOGGSON & PETTIS MFG. CO. • New Haven, Conn.

SEE ADVERTISERS INDEX, PAGE 67, FOR KEY NUMBERS

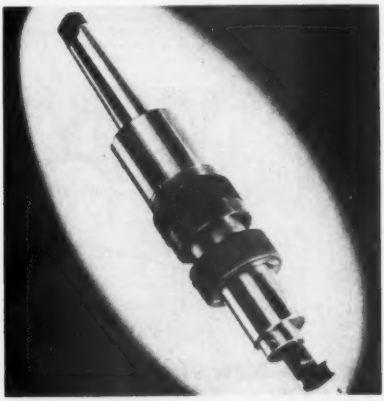
PROGRESS ON PARADE

A NEWLY DESIGNED BILLET SHEAR is now being manufactured by the Thomas Machine Manufacturing Co., Pittsburgh, with gears and motor drive overhead, and all moving parts

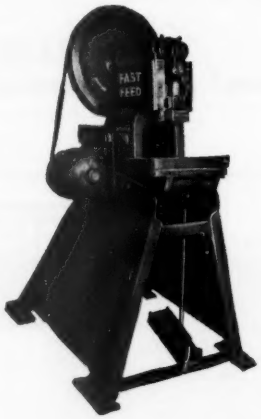


enclosed. This advanced design results in a 50 per cent floor space economy over conventional shears, greater safety and easy accessibility. The housing is all cast steel, the jaw-type clutch is air-operated, and cast steel herringbone cut gears run in an oil bath. The machine pictured above is 1200 ton capacity. THE THOMAS MACHINE MFG. CO., Dept. 994, Butler Rd., Pittsburgh 23, Pa. **Inform-A-Gram Key No. A77.**

A JIG AND FIXTURE TYPE RECESSING TOOL has been developed by The Maxwell Co., Bedford, Ohio, for precision recessing where the tool must work through jigs or fixtures. The tool is available in three sizes to machine diameters ranging from ½ to 2 $\frac{5}{16}$ inches. It will pilot into standard bushings and operate on any manual or automatic feed spindle. Cutters and tool shanks are both interchangeable. The cutters are interchanged by releasing the combination lock and friction clamp. Various types of cutters can be used, giving the tool a wide range of application. Maxwell guarantees these tools unconditionally and will furnish detailed information upon request. THE MAXWELL CO., Dept. 42, 225 Broadway, Bedford, Ohio. **Inform-A-Gram Key No. A47.**



FINGERTIP VARIABLE CONTROL on the Fast-Feed, open-back inclinable punch press now makes possible 180 to 500 press strokes per minute. Manufactured and marketed by the Fast Feed Machine Co., these new



presses embody important construction features which contribute to increased production at lower production and maintenance costs. Features of the Fast Feed Press include a clutch mechanism which can be set for positive single stroke or continuous operation; standard type knockout; bronze bearings; and more die space than is usual in conventional models. The press handles a 19 ton load capacity and at the flywheel variety. Its die space is 8½ inches while its operating speed is 300 strokes per minute. FAST FEED MACHINE CO., Dept. 20, 205 Kunkle Bldg., Ashtabula, Ohio. **Inform-A-Gram Key No. A51.**

High Speed Grinder 18,000 R.P.M.!

It's new!

it's the Haskins

VB-2!

Haskins VB-2 High Speed Grinder

THIS new Haskins high-speed grinder answers the need for a flexible shaft machine that has the speed and power to operate small grinding wheels and carbide rotary cutters efficiently. Designed for both bench and suspended use, the new VB-2 has a high-speed, cool-running flexible shaft and ball-bearing collet-type spindle—develops 18,000 r.p.m. free speed—makes cutting wheels and tools last longer. Find out today why it is becoming an indispensable tool for general light production work. Write for details.

R. G. Haskins, 2651 W. Harrison St., Chicago 12, Ill.

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FLEXIBLE SHAFT EQUIPMENT

Accurate Spacing- *by the Thousandths*

DE-STA-CO ARBOR SPACERS

Save time in setting up milling machine cutters, and wherever accurate spacing must be obtained and *maintained.*

Made of metal. Not only for greater accuracy, but also because they will not be affected by heat or oil. And can be used over and over. Standard sizes from .001″ to .125″. Specials, cut from bar stock, in any length and ground to decimal.

Order a set of De-Sta-Co Spacers from your Mill Supply Distributor today.

DETROIT STAMPING CO.

Established Over 30 Years

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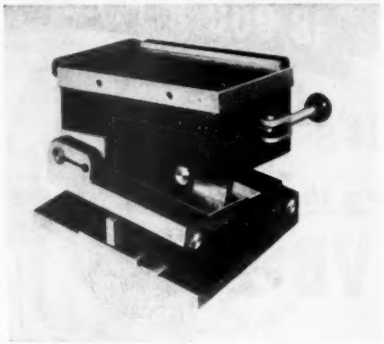
SEE ADVERTISERS INDEX, PAGE 67, FOR KEY NUMBERS

PROGRESS ON PARADE

"EXPLODED AIR"—a new development in air mechanics—gives the Bryant bench-type production hammer an impact force ranging from one ounce to 12,000 pounds with 100 pound line pressure. This newest addition to the Bryant line of air-hydraulic presses employs the following principle: Air, under high pressure, is equalized on both sides of the piston. The air below the piston is then exhausted suddenly; the resulting blow is

remarkable in a press this size. This press is ideal for light stamping and forging, trimming, molding, crimping, coining, riveting, piercing, and staking and forming in various materials. Special features of the Bryant press include constant stroke, variable impact pressure to suit press capacity, few moving parts, and elimination of breakdown due to variation in stock thickness or improper positioning. Hand, foot or fully automatic operation is available. BRYANT PRODUCTS DISTRIBUTING CO., Dept. 73, 297 W. Michigan Ave., Jackson, Mich. **Inform-A-Gram Key No. A53.**

MAGNA-SINE WITH PERMANENT MAGNET CHUCK is now available, according to a recent announcement by the manufacturer, Robbins Engineering Co. The Magna-Sine, with electric magnet chucks, have solved angular setup problems on surface grinders in such a fast, accurate, and sturdy manner that they have been widely accepted for many years in all inspection, grinding and boring operations. Now, with the new permanent-magnet chuck, either wet or dry machining operations can be performed. The amount of magnetic power is controlled by turning the handle (shown on right in photograph). For



more details write ROBBINS ENGINEERING CO., Dept. 617, 318 Midland Ave., Detroit 3, Mich. **Inform-A-Gram Key No. A46.**

A NEW SHAPED CARBIDE-TIPPED TOOL has been added to The R. F. Cook Manufacturing Company's standard line of carbide-tipped cutting tools which can perform turning and

single chamfering operations. Like the other tools in the line, the new tool has four individual cutting edges and each tool can be used through all four cutting positions before production must stop for tool resharpening. Suitable for either high-speed long production jobs or for limited-piece operations, the tool can be used on any type of automatic. Ready in stock at R. F. COOK MFG. CO., Dept. 75, 2732 Second St., Cuyahoga Falls 16, Ohio. **Inform-A-Gram Key No. A82.**

Mac-it ALLOY STEEL SCREWS

GREATER STRENGTH
where you want it, with
HOLLOW SET SCREWS!

Mac-it Hollow Set Screws will solve your toughest holding-down problems where flush surfaces, compact construction and a neat appearance are factors. *All* Mac-it screws are heat-treated and accurately made with die-cut threads. Whatever your needs, let the *complete* Mac-it line serve you. Sold through recognized distributors from coast to coast and in Canada.

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CLEVELAND 13, OHIO
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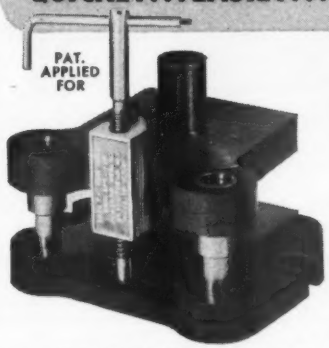
MAC-IT PARTS COMPANY LANCASTER, PA

DIE SETS SEPARATED AND ASSEMBLED QUICKLY...EASILY...SAFELY...WITH THE NEW PERSSON DIE JACKS



A few good territories still open for representation. Write for details and literature.

Eliminate old-fashioned, unsafe prying or hammering methods in your shop. Just clamp on punch holder and turn handle. Punch holder is raised or lowered smoothly - always under control. Die Jacks are made from fine steel and alloys. They are precision built tools every tool maker will want for his tool box or bench drawer.

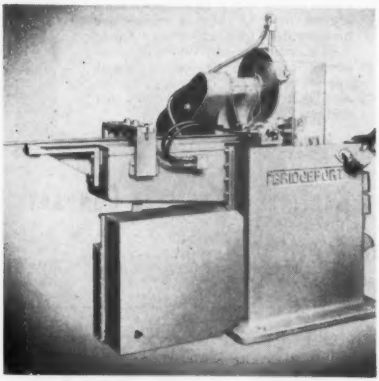
NO PRYING OR HAMMERING — EASY DOES IT EVERYTIME!

T. G. PERSSON MFG. CO., 224 GLENWOOD AVE., BLOOMFIELD 4, N. J.

SEE ADVERTISERS INDEX, PAGE 67, FOR KEY NUMBERS

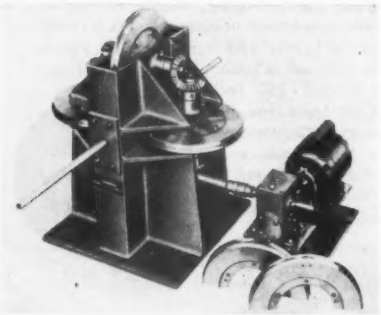
PROGRESS ON PARADE

ALMOST EVERY MATERIAL USED IN MODERN INDUSTRY CAN BE CUT accurately, easily and speedily with the new fully automatic abrasive cut-off machine now available at Bridgeport Safety Emery Wheel Co., Stratford, Conn. The machine is designed for high speed cutting-off of stock up to 2" square to lengths ranging from ¼" to 12". The head assembly, which consists of an 18" abrasive cut-off wheel driven through V-belts by a 10 hp motor, is mounted on a rocker shaft running in Timken bearings and is actuated by



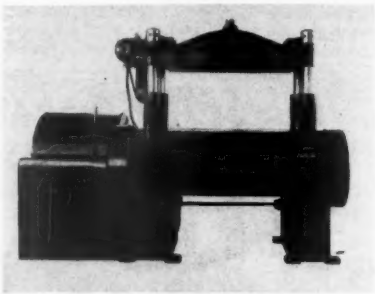
a hydraulic cylinder which feeds the wheel in and out of the cut. The hydraulically operated feed mechanism is synchronized with the cutting head. Exceptionally high production rates are possible with this Bridgeport "51". BRIDGEPORT SAFETY EMERY WHEEL CO., 1309 W. Broad St., Stratford Conn. **Inform-A-Gram Key No. A90.**

HIGH-SPEED AUTOMATIC MARKING DEVICE, for stamping seamless and light-wall



aluminum, and copper and brass tubing, is offered by Pannier Bros. Stamp Co., Pittsburgh. This Pannier "Master Marker" can stamp one, two, three or four sides on the same run at a rate up to 300 feet per minute. It handles bars also—round, square, hexagon, and other shapes—in sizes ⅜" to 2" diameter. It is equipped with a ⅓ hp motor and can be used for production or job work — being either portable or stationary. For further details and specifications, or bulletin describing it, write PANNIER BROS. STAMP CO., Dept. 17, 222 Pannier Bldg., Pittsburgh 12, Pa. **Inform-A-Gram Key No. A50.**

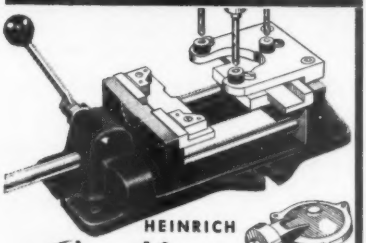
A NEW 100 TON TRYOUT PRESS is being manufactured by Alpha Tool Works, Detroit, Michigan. There are several unusual features that have been incorporated into the press. It can operate at 60 strokes per minute, thus giving an accurate idea of actual production conditions. The head lifts out of position electrically and inverts so that both members of the die are easily accessible for finishing work without removing the die from the press. After the finishing operation, the head returns by electric control to its original position for another



production test. Ground and hardened locating pins relocate the head accurately. For further details write ALPHA TOOL WORKS, Dept. 20, 9279 Freeland Ave., Detroit 28, Mich. **Inform-A-Gram Key No. A43.**

A NEW LINE OF STOCK REELS AND SCRAP WINDERS—25 different models—has been added to the present line of automatic roll feeds by La Bahn Machine and Manufacturing Co., Menlo Park, New Jersey. The reels can be tilted from vertical to horizontal through an arc of 90° and most of the models feature self-centering. They can be adjusted to different heights and have adjustable stock guides. For the new brochure describing this complete line in detail, send to LA BAHN MACHINE & MFG. CO., Dept. 27, Menlo Park, New Jersey. **Inform-A-Gram Key No. A89.**

2 TIME SAVERS



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This Amazingly Fast Drill Press Vise May Also Be Used as a Base Structure for Jigs & Fixtures.

This unique *screwless* vise provides instantaneous, effortless setting. Patented gripping mechanism guarantees positive locking. Wide clearance between guide bars permits clear-through drilling. Built-in parallels save leveling time. Write for folder.

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- ✓ Shearing
- ✓ Punching
- ✓ Rod Cutting

A five-in-one "handyman" which nibbles (outside and inside), shears, punches and cuts rods. Eliminates hours of tedious hand - work. Quickly, easily cuts templates and trial blanks in any desired shape. Takes up to 3/8" flat stock. Also 3/8" round stock. Write today for illustrated folder.

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SPEEDS ASSEMBLY

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Reg. U. S. Pat. Off.

The KNURLED Head of the "Unbrako" Socket Head Cap Screw *speeds assembly*, because it provides a slip-proof grip,—even if the fingers and head are oily—therefore, you can screw this "Unbrako" in faster and farther before a wrench becomes necessary. The *Internal Wrenching* feature facilitates compact designs . . . reduces weight and costs. They are available in sizes from No. 4 to 1½" diameter, in a full range of lengths. Ask for *your* copy of the "Unbrako" Catalog.

Knurling of Socket Screws originated with "Unbrako" in 1934.

KITS: Pat's. Pend.

You can't tighten or loosen socket screws without a hex socket wrench, so why not use our No. 25 or No. 50 "Hallowell" Key Kit, whose Hollow Handle contains most all hex bits.

Write us for the name and address of your nearest "Unbrako" and "Hallowell" Industrial Distributor.

OVER 45 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

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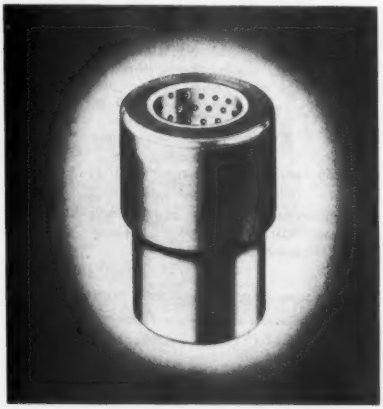
ROGRESS ON PARADE

GAIRING'S ECONO-MILL, the recently announced standard face mill, has several new improvements. Carbide tips on the

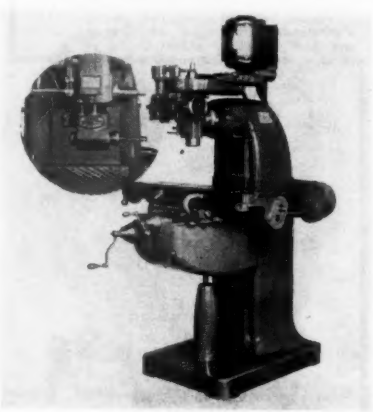
square tool bit type blades have been increased from 3/8" to 5/8" in width, extending the full width of the blade—3/4" back from the cutting edge. The blades, which are furnished with all clearance angles finish ground, are now protected by a plastic coating and come individually cartoned. The blades are now clearly branded in different colors to distinguish between the three different types. For easy, accurate and quick assembly of blades into cutter bodies, an assembly fixture is now available for all sizes of cutters. THE GAIRING TOOL CO., 21227 Hoover Road, Detroit, Mich. **Inform-A-Gram Key No. A23.**

NEW, LOW FRICTION BUSHINGS, which greatly increase the accurate life of die sets,



have recently been announced by Standard Machinery Company. These new "Standard" Indium Bronze guide pin bushings have a basic hard steel body and a special bearing bronze liner electrolytically alloyed with Indium, thereby offering the advantages of a nonferrous bearing surface with indented spherical oil pockets. The widely distributed oil pockets make a large reservoir of lubricant available, for the Indium does not replace normal lubrication but reduces tendency of pins and bushings to seize and wear if the lubricant does not completely cover the bearing area. Available in seven sizes ranging from 1" to 3" inside diameters, they are furnished when specified in "Standard" steel die sets, and, with "Standard" super-finished guide pins, will replace corresponding parts on any other make of die set. For further information write STANDARD MACHINERY CO., Dept. 30, 1531 Elmwood Ave., Providence 7, R. I., or circle **Inform-A-Gram Key No. A84.**

NEW MODEL 50 HIGH SPEED VERTICAL MILLING MACHINE was announced by the Index Machine Company of Jackson, Michigan, at the ASTE Industrial Exposition in Cleveland.



This Model 50 has a wide range of working capacity and can be used for vertical and horizontal milling as well as boring and drilling. Spindle downfeed and table feed are automatic. The machine's newly developed right angle milling head accurately handles horizontal milling operations of every type. The head unit can make the change-over from vertical to angle milling in a few seconds without disturbing the work on the table. INDEX MACHINE CO., Dept. 52, 543 N. Mechanic, Jackson, Mich. **Inform-A-Gram Key No. A27.**

PRECISION TOOLS

Toolmakers DeLuxe Vises

1—2—3 Blocks

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5" Sine Bar

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NEW BALL BEARING LIVE CENTER

Designed for maximum strength and rigidity, the Ball Bearing Live Center is recommended for high speeds, heavy roughing cuts, etc. 60 degree point runs in substantial precision ball bearing which is easily replaceable.

Center with No. 2 taper shank **$11.50**

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35 YEARS OF DIE SET MAKING

THE DIE-SET AUTHORITY

All Baumbach Die-Sets have demountable Leader Pins and Bushings. This exclusive feature permits removing leader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.

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BALL BUSHINGS

Sliding linear motions are nearly always troublesome. *Unlimited travel* BALL BUSHINGS can be used to tremendous advantage on guide rods, guide posts, reciprocating shafts and for support of any mechanism that is moved or shifted in a straight line.

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ELIMINATE BINDING and CHATTER
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LOW FRICTION and WEAR
LONG LIFE — LOW MAINTENANCE
SOLVES SLIDING LUBRICATION PROBLEMS

Now available for ¼", ½", ¾" and 1" shaft diameters. Additional sizes to follow.

Write for literature and name of our representative in your city. No obligation, of course.

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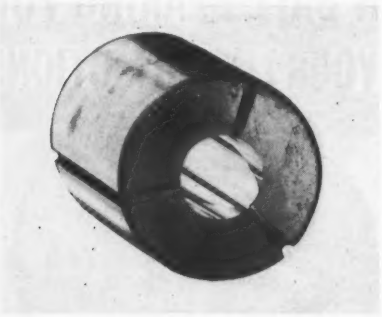
PLANTS: Manhasset, Long Island.... Lancaster, Pa.

FRICTION COSTS MONEY

ROLL IT DON'T SLIDE IT

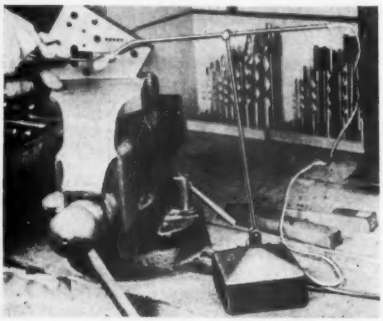
PROGRESS ON PARADE

LAPPING AND POLISHING OF FORGING DIES with Hyprez Diamond Compounds greatly increases the efficiency and prolongs the life of the die. Scratches, nicks, and pits



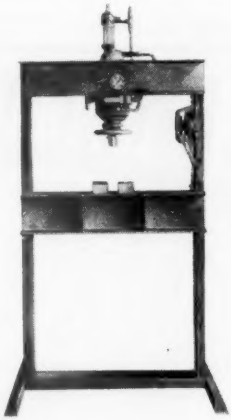
are removed and a smooth mirror-like finish results. Polishing is of particular importance when forging aluminum or magnesium—areas in which the greatest deformation takes place should be polished more thoroughly. Hyprez Diamond Compounds come in eight different grades of diamond powder with up to four different diamond concentrations. The abrasive content of Hyprez consists exclusively of clean, virgin, accurately graded diamond powders, uniformly distributed and suspended in a patented stable compound of identifying integral color. Hyprez Compounds come sealed in dust-proof glass cartridges which are loaded into the Hyprez applicator gun—a gun especially designed for economy and simple operation. The above photograph shows a Hyprez-polished die. HYPREZ DIV., ENGIS EQUIPMENT CO., Dept. 939, 431 S. Dearborn St., Chicago 5, Ill. **Inform-A-Gram Key No. A58.**

ADJUSTABLE TOOL AND DIE MAKERS' LIGHT, manufactured by Twentieth Century



Mfg. Co., is made with a special reflector tip bulb which does not reflect or throw a glare into the user's eyes. This Uneeda light extends 20" from the base and is ideal for all close precision work requiring fine direct light. Inspectors, too, find the Uneeda light to be valuable in locating flaws, burrs and other defects. The base is of bakelite and all parts are of brass and bright nickel. The light is portable, adjustable by hand to any desired location, and is sold with batteries, or an AC transformer. The weight is 2 pounds, and the arms extend 25 inches. The diameter of the light stem and bulb is only $\frac{7}{16}$". There is a special adapter coupling to connect bulb to wire without stem, permitting bulb to get around corners or intricate places. TWENTIETH CENTURY MFG. CO., Dept. 11, 3720 Montrose Ave., Chicago 18, Ill. **Inform-A-Gram Key No. A6.**

THE NEW DAKE SERIES OF AIR-HYDRAULIC PRESSES offers unusual facility and speed of operation. Available in 25, 50, and 75 ton capacities, these presses come equipped with either of two pumps: one providing rated tonnage at 145 lbs. air pressure;



the other, 90 lbs. air pressure. The presses have two simple valves with which the operator controls pressure application, while a special safety valve prevents overloading. Outstanding features of the Dake series are: greater speed, easier operation, greater power at lower cost. An optional pressure control mechanism is available for providing air pressures lower than line pressure. These presses have exceptional utility in both tool shops and production departments. DAKE ENGINE CO., 634 Seventh St., Grand Haven, Mich. **Inform-A-Gram Key No. A65.**

Why a *Commander* Tapper?

- **Tapping capacity** 0 to ¾" with **one** tapper.
- **Torque control**—may be adjusted to protect any size tap. This assures safe bottom-hole tapping.
- **Spring clutch** drive eliminates slippage and wear . . . provides smooth, quiet, positive operation.
- **Compactly built**—affords maximum visibility of tapping operation.
- Furnished to fit **any** Drill Press.

Write for circular and name of your nearest Distributor.

One COMMANDER TAPPER handles the range #0 to ¾"

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Product of *Commander* . . . Builder of the *Multi-Drill*

Severance TUBING CUTTER GROUP - FOR FAST DEBURRING OF EVERY MACHINEABLE TYPE TUBE . . .

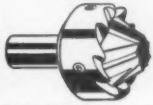
TUBE DEBURRING CUTTERS (Standard)

18 Standards in H.S.S. and Cemented Carbide

ADJUSTABLE TYPE

Adjustable from 1/2" - 2-1/2" O.D.—for short runs

TUBE CHAMFERING MILLS



23 sizes from 3/16" - 2-1/2" O.D. — Chatterless

SOLID TUBE DEBURRING CUTTERS

16 sizes from 1/4" - 1-5/8" O.D. — H.S.S. and Carbide

SPECIAL TUBING CUTTERS

From light hand-deburring up to close tolerance deburring, chamfering, flaring . . . For working non-ferrous metal, steel (including stainless) and plastic tubing . . . For combining reaming, sizing or flaring with end facing and deburring . . . Whatever the operation or material, Severance HSS and Cemented Carbide Tube Deburring Cutters are TOPS in performance — long life — economy.

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COMPLETE REGRINDING SERVICE BY NEW TOOL CRAFTSMEN SAVES YOU MONEY.

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OTHER FEATURES:

Hardinge Dovetail Bed with Hardened and Ground Steel Ways • Free-Spindle Clutch • Headstock with Center Drive • Patented Positive Lock Slide Rest • Full Bearing Tailstock Spindle • Fluorescent Type Lamp • Large Tool Storage Compartment

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Infinitely Variable Speed
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PUBLICATION PREVIEWS

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DRILL JIG BUSHINGS, as shown in the photograph below, are presented in a new catalog by the American Drill Bushing Co., Los Angeles, California. The catalog lists and illustrates all of American's standard ready-in-stock bushings. These are, of course, ready for immediate shipment. For quick and easy selection of the correct size and style, specification tables are included in the

catalog. Send for your copy to AMERICAN DRILL BUSHING CO., INC., Dept. 41, 1110 So. Santa Fe Ave., Los Angeles 21, Calif., or circle **Inform-A-Gram Key No. B70.**

TOOL AND PRESS ROOM SUPPLIES AND EQUIPMENT, for modernizing the shop and plant, are presented in a four-page circular by Durant Tool Supply, Providence, Rhode Island. The automatic scrap choppers shown are independent units and can be moved from press to press. They are completely automatic and eliminate all handling of used scrap. Stock reels, roll feeds and stock oilers are also shown with prices and specifications. On page four is pictured a modern power press setup using the equipment already mentioned. This installation is completely automatic and can be supervised by only one operator. Copies of the circular are available from DURANT TOOL SUPPLY CO., Dept. 44, 155 Orange St., Providence 3, R. I., or circle **Inform-A-Gram Key No. B80.**

OF INTEREST TO TOOL ENGINEERS AND DESIGNERS will be the 16-page catalog of standardized drill jigs recently published by Acme-Danneman Co., Inc., New York. Filled with helpful engineering data, it shows ways to save long hours of jig and fixture design, and ways to speed up machining operations. More than 50 standard styles and sizes are ready in stock for immediate shipment. This informative fully-illustrated catalog (No. 49) is available from ACME-DANNEMAN CO., INC., Dept. 39, 203 Lafayette St., New York 12, N. Y., or **Inform-A-Gram Key No. B67.**

CARBIDE-TIPPED CUTTING TOOLS are illustrated and described in a new 60-page buyers' guide catalog recently completed by Wendt-Sonis Co., Hannibal, Missouri. For easy and accurate selection of the correct size and type of tool, specification tables are provided. Five pages of helpful engineering and operating data are included, as well as a chart on resharpening directions. Each Wendt-Sonis carbide-tipped tool is provided with a molded plastic cover over the tip for protection in transit and handling, and against air and moisture. Send for Catalog No. 646, revised, to WENDT-SONIS CO., Dept. 518, Tenth & Collier Sts., Hannibal, Mo. **Inform-A-Gram Key No. B68.**

18,000 OPERATIONS PER HOUR are assured with the "Emco W" bench-type power punch press. This simply designed, easy-to-

operate press is sturdily built for long and heavy wear. The "Emco W" does not repeat —no added safety features are necessary. It is photographed and described, and its specifications are given in a 4-page brochure published by, and available from the manufacturer, THE KLAAS MACHINE & MFG. CO., Dept. 40, 4314 East 49th St., Cleveland, Ohio. **Inform-A-Gram Key No. B69.**

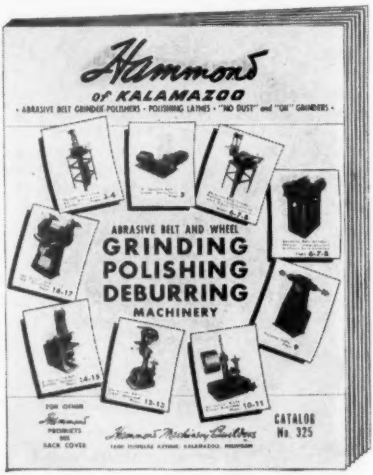
AN INFORMATIVE BULLETIN ON RY-AX STEEL, the trade name of a heat treated carbon-manganese hot rolled bar steel, is just off the press from Joseph T. Ryerson & Son, Inc., Chicago. The bulletin includes a general description of the steel and when and where it is used. Its high fatigue resistance and excellent machinability make it ideal for shafts, axles and the like. This is the improved Ry-Ax steel which has higher tensile strength, better machining qualities and higher fatigue limit than Ryerson's former heat treated carbon-manganese steels. The bulletin is illustrated with various job applications and is available from JOSEPH T. RYERSON & SON, INC., Dept. 451, Box 8000-A, Chicago 80, Ill. **Inform-A-Gram Key No. B71.**

"MILMASTER", A NEW MILLING ATTACHMENT for vertical milling and other machines, is dramatically presented in a new brochure by Bemis & Call Co., Springfield, Mass. The "Milmaster" literally converts one machine into a complete tool shop, reduces the number of setups, and increases production. Some of its many and varied applications (such as angle milling; horizontal milling—at right angles or parallel to table; right-angle end milling, drilling, boring and reaming; milling keyways; and rack cutting) are pictured in the brochure and accompanied by pithy copy. Send for your copy to BEMIS & CALL, Dept. 18, Springfield, Mass., or circle **Inform-A-Gram Key No. B72.**

GROUND-FROM-THE-SOLID MIDGET MILLS of high speed steel and cemented carbide are illustrated, tabulated and described in a handy pocket-size folder issued by Severance Tool Industries Inc., Saginaw, Michigan. The folder includes an interesting, terse treatise on the many uses of these versatile tools. Each shape is illustrated, and listed in size and price. Send for a copy to SEVERANCE TOOL INDUSTRIES, INC., Dept. 461, 730 Iowa St., Saginaw, Mich., or circle **Inform-A-Gram Key No. B73.**

BRASS AND ALUMINUM HAMMERS, for machinists, mechanics and foundrymen who drive work which must not be marred or damaged, are offered by Kloppenborg Aluminum Foundry, Davenport, Iowa, in a new circular. Both brass and aluminum hammers have hickory handles and come in three sizes. They are listed as to size, length of handle, head weight and price. Send for a copy to KLOPPENBORG ALUMINUM FOUNDRY, Dept. 42, 211 Marquette St., Davenport, Iowa, or circle **Inform-A-Gram Key No. B74.**

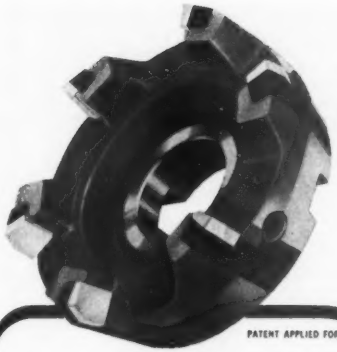
GRINDING, POLISHING AND DEBURRING MACHINES are discussed thoroughly in the new 20-page Catalog, No. 325, pictured below, and published by Hammond Machinery Builders, Inc., Kalamazoo, Michigan. Included in the catalog are pictures of the many products which can be finished on these machines, photographs of actual job applications with descriptive matter and interesting technical



data. Your copy is available by writing HAMMOND MACHINERY BUILDERS, INC., Dept. 95, 1600 Douglas Ave., Kalamazoo, 54F, Mich., or by circling **Inform-A-Gram Key No. B75.**

CHECK LIST FOR BETTER GRINDING is a new booklet published by The Carborundum Co. showing seven important grinding advantages obtainable with their series "20" grinding wheels. The series "20" covers a wide range of work—surface grinding of all types of metal, wet or dry grinding, tool and cutter grinding, and surface form grinding. They are available in a broad range of standard grinding wheel sizes and shapes to meet modern machine engineering requirements. CARBORUNDUM CO., Dept. 10, Niagra Falls, N. Y. **Inform-A-Gram Key No. B41.**

CUTTING AND GRINDING COMPOUNDS for every type of operation are offered by Machinery Lubricants, Inc., Boston. In a six-page folder their "Silver Chip" No. 560 and



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E-CON-O-MILL

STANDARD CARBIDE FACE MILL

CUT DOWN TOOL INVENTORY

All cutter bodies, made 5-inch diameter and over, take the same size blades and locks. Blades have different radial rakes for cutting steel, cast iron, and non-ferrous materials.

SAVE ON GRINDING COSTS

New blades come finish-ground, individually cartoned, ready to be put to work. They may be re-sharpened one by one on a carbide grinder. E-Con-O-Mill checking gage insures quick and accurate duplication of cutting edges.

REDUCE DOWN-TIME OF MACHINES

Blades may be removed by hand, without removing cutter body from machine. Locks stay attached to the body. New or re-sharpened blades may be lined up against the cut in the work.

THE GAIRING TOOL COMPANY,
21227 Hoover Road, Detroit, Mich.

GAIRING TOOLS

Write for illustrated folder which gives complete data and prices.

UNIVERSAL

DRILL BUSHINGS

Universal Drill Bushings with superhoned bores have been the first choice of industry since the founder of Universal Engineering Co. originated standard drill bushings nearly 30 years ago. Available in standard and special sizes to speed and simplify your jig drilling at greatly reduced tool breakage costs. Complete stock of standard bushings available for immediate shipment. Write today for complete information.

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FRANKENMUTH 8, MICHIGAN

SEE ADVERTISERS INDEX, PAGE 67, FOR KEY NUMBERS

Grade No. 2 are analyzed and their uses and advantages discussed. No. 560 is the cutting oil—skillfully developed for use in high-speed machining with cemented carbide tools; while Grade No. 2 is the new efficient grinding compound. MACHINERY LUBRICANTS, INC., Dept. 26, 31 St. James Ave., Boston 16. Mass. **Inform-A-Gram Key No. B42.**

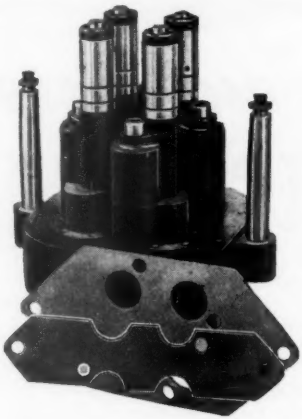
FLEXIBLE SHAFT EQUIPMENT for the die and mold shop is presented by R. G. Haskins Co., Chicago, in two new catalogs. Haskins' flexible shaft machines are designed for production work and deliver constant power for such operations as grinding, sanding, rotary filing, buffing and polishing. Haskins' various models—bench-type, portable, and caster-type —are described and illustrated with photographs of the machines, accessories and typical job applications. R. G. HASKINS CO., Dept. 70, 2651 W. Harrison St., Chicago 12, Ill. **Inform-A-Gram Key No. B61.**

NORTON GRINDERS AND GRINDING WHEELS for every type of grinding operation are comprehensively covered in recent literature published by Norton Co., Worcester, Mass. Norton's hydraulic surface grinding machines, tool and cutter grinders, and universal grinders are thoroughly described as to construction, application, sizes, capabilities, equipment, accessories and specifications. The catalogs are profusely illustrated with photographs, drawings and diagrams—everything needed by the buying executive in making his selection. Also available is a condensed catalog of factory-stocked grinding wheels—ready for immediate delivery. This catalog should prove to be of great value to users of abrasive products for easy and quick selection and delivery. NORTON CO., Dept. 545, Worcester 6, Mass. **Inform-A-Gram Key No. B63.**

UNIVERSAL DRILLING PLATE, manufactured by Montgomery & Co. Inc., New York, is simply designed for easily drilling and reaming accurate holes. It can be readily attached to drill presses, jig borers and lathes. In a 4-page brochure, Montgomery presents this handy drilling plate and their clamping blocks for easy setups on lathes, grinders, etc. The brochure includes photographs of the devices, prices and measurements. MONTGOMERY & CO., INC., Dept. 89, 53 Park Place, New York 7, N. Y. **Inform-A-Gram Key No. B66.**

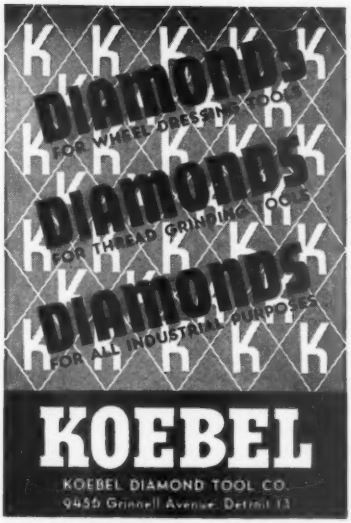
CARBIDE-TIPPED MASONRY DRILLS with spiral flutes are graphically portrayed in a new circular recently published by their manufacturer, Whitman & Barnes, Providence, Rhode Island. These spiral-fluted drills have new advantages over other types; they can drill deeper holes, they penetrate more freely, and create less friction—and therefore less heat with a resulting longer life. Less pressure is required from the operator, and the spiral flutes clear dust out of holes, which lessens the tendency to bind and break. Sizes and prices are listed in this handy circular available from WHITMAN & BARNES, Dept. 502, 2100-2200 W. Fort St., Detroit 16, Mich. **Inform-A-Gram Key No. B76**

AN ADJUSTABLE MULTIPLE DRILL HEAD, substantially constructed and entirely gear-driven, is announced in a new brochure published by Strutz & Mead, Inc. This efficient production tool, known as the Wisconsin "Kwick-Change" Drill Head is designed for long-run multiple drilling operations. Shown in the photograph below is a standard 4-spindle head with the templates removed.



Note that the positioning template with half-holes is first placed on the support posts for preliminary adjustment of the spindles. The locking template is placed right over the positioning template. Various setup views of both 4-spindle and 6-spindle heads are shown in the brochure; also specifications and detailed descriptions. Send for your copy to STRUTZ & MEAD, INC., Dept. 65, 1225 N. Water St., Milwaukee 2, Wis. **Inform-A-Gram Key No. B97.**

A NEW GAGE BLOCK FOLDER, showing a complete list of Webber Micro-Accurate Gage Blocks, is available now from the manufacturer. Interesting information on their manufacturing procedure is included in the folder—and short theses on the six basic requirements which affect their quality. Webber's different sets are pictured and their ranges and accuracies given. Send for a copy to WEBBER GAGE CO., Dept. 621, 12900 Triskett Rd., Cleveland 11, Ohio. **Inform-A-Gram Key No. B94.**



OLIVER BENCH MODEL

The Oliver Die Making Machine is adaptable to light or heavy sawing and filing operations on tool steels up to 1" thick. It stands up—many units have been in continuous use for more than 25 years, cutting direct labor costs from 50% to 60% in many cases.

A Heavy Duty model is available for work on steels up to 3" thick.

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Oliver Instrument Co.
1436 E. Maumee Adrian, Michigan

OLIVER OF ADRIAN

SEE ADVERTISERS INDEX, PAGE 67, FOR KEY NUMBERS

PUBLICATION PREVIEWS

A COMPLETE LINE OF FORMULATED OILS is offered in an informative new folder, illustrated below, put out by Welding Equipment & Supply Co., Detroit. The folder contains an interesting technical treatise on graphite suspension in oils. Eureka graphited soluble oils, cutting oils, conveyor lubricants and conveyor grease are fully described and their analyses

are given. The many advantages of these oils are explained—such as greater lubrication, longer life for the coolant, and increased tool life and efficiency. Your copy available by writing WELDING EQUIPMENT & SUPPLY CO., Dept. 580, 223 Leib St., Detroit 7, Mich., or by circling **Inform-A-Gram Key No. B88.**

PUNCHES, DIES AND PUNCHING ACCESSORIES are presented by Ward Machinery Company in a newly published catalog. Among the items illustrated and described in this clear, concise brochure is the No. 32 punch and die cabinet. Of heavy metal, the cabinet has 64 compartments for punches and dies, and 29 sets of round punches and dies. Another kit, No. 56, is similar to the No. 32, except that it has 112 punch and die compartments and 56 sets of round punches and dies. Ward also presents a multiple punch and die set with spring stripper for increased production by multiple hole punching. A large line of standard punches and dies, of both open type and leader pin type, are illustrated as well as adapters and die shoes. Catalog available from WARD MACHINERY CO., Dept. 47, 562 W. Washington Blvd., Chicago 6, Ill. **Inform-A-Gram Key No. B89.**

HIGH SPEED POWER FILING results in tremendously increased production with resultant decrease in cost. Graham Rotary File & Tool Corp. demonstrates some of these amazing mass production feats, performed with their high speed steel rotary files, in a recently published brochure. The various sizes and shapes of power rotary files are shown performing many and varied operations. Some of these operations are polishing, burring, shaping, undercutting, trimming and reaching places usually inaccessible. Send for a copy of the catalog to GRAHAM ROTARY FILE & TOOL CORP., Dept. 11, 4816 Tacony St., Philadelphia 37, Pa. **Inform-A-Gram Key No. B90.**

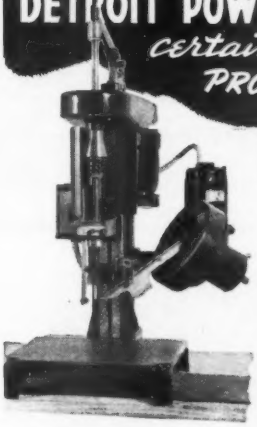
MOUNTED GRINDING WHEELS AND POINTS, in a vast range of sizes and shapes, and manufactured in different bonds for particular jobs, are offered by Bay State Abrasive Products Company in a new folder. Every wheel and point is made from solid blocks of scientifically mixed abrasive and bond. The resultant evenness of mixture eliminates troublesome "hard and soft spots" in individual wheels. The folder includes processing details and photographs of the various wheels. Available from BAY STATE ABRASIVE CO., Dept. 205, 1 Union St., Westboro, Mass. **Inform-A-Gram Key No. B92.**

FOR REDUCING FRICTION DRAG and increasing production, Scientific Lubricants Company offers Motor Mica—an anti-friction compound to be added to lubricants. Motor Mica establishes a lubricating film on moving parts that prevents metal-to-metal contact. It is not affected by heat and provides all bearing surfaces with a slippery, frictionless film of lubrication. Its many valuable assets to industry today are detailed in a folder available from SCIENTIFIC LUBRICANTS CO., Dept. 456, 3469 N. Clark St., Chicago 13, Ill. **Inform-A-Gram Key No. B93.**

FOR TOUGH REAMING OPERATIONS, needing both accuracy and high production, Pratt & Whitney offer their Camlock adjustable serrated blade reamers. In Circular No. 507 these strong, rigid and long-wearing reamers are lucidly described, photographed and listed as to size and price. In a second catalog (No. 508), Pratt & Whitney's carbide tipped high speed steel reamers are shown in two models—fluted chucking, and adjustable reaming. Prices and sizes of these reamers are also clearly and simply charted for easy selection. Send for your copies to PRATT & WHITNEY, Dept. 430, 1 Charter Oak Blvd., West Hartford 1, Conn. **Inform-A-Gram Key No. B77.**

"STANDARD" TOOL AND DIE ACCESSORIES can be easily selected and ordered from Standard Machinery Company's new catalog section DA. Socket cap and set screws, pressure pad strippers, knock-out springs, hardened and ground dowel pins are presented in a simple, clear manner—charted as to

DETROIT POWER SCREWDRIVERS *certainly help Our PRODUCTION!*



Many a manufacturer knows from experience how important Detroit Power Screwdrivers are where assembliesare fastened with screws.

If you have a production screw-driving problem, by all means investigate these modern, time, labor and money-saving machines. 3 models to drive screws from No. 2 to 5/16" diameter. No marring of heads, no stripping threads, all screws driven to uniform tension. SEND SAMPLE ASSEMBLIES FOR ESTIMATE AND FREE CATALOG.

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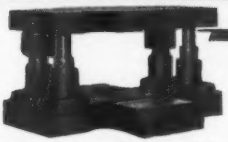
Get More Production PER GRIND with Microlex Anti-friction Die Sets



U. S. Patent Nos. 2,422,774—2,422,775

INCREASE PRESS ACCURACY

BALL JOINT SHANKS eliminate perpendicular misalignment between shank clamp bushing and die set.

BALL ACTION DIE ALIGNERS automatically correct press misalignment, front to back, right to left, or diagonal. Matched spherical plates, machined and cadmium plated for long life.

As much as twice the usual production per grind is routine performance for these precision die sets, according to actual job records. Responsible for their success are pre-loaded ball or roller bearing guide pins. Pre-loading prevents play between pins and bushings, guarantees perfect alignment and precise parallelism, so that punch and die engage cleanly and squarely every time.

Microlex Anti-Friction Die Sets set up quickly and easily . . . open and close freely by hand . . . eliminate lubrication troubles . . . give you more production per grind and longer die life. They are manufactured in any standard or special size to meet your exact specifications. Write for catalog.

EVANS REAMER AND MACHINE CO. New Lexington, Ohio

dimensions, prices and type of steel. Also shown are Standard's miscellaneous springs for jig and tool applications. Send for a copy to STANDARD MACHINERY CO., Dept. 30, 1531 Elmwood Ave., Providence, R. I., or circle **Inform-A-Gram Key No. B78.**

THE MODERN, EFFICIENT LAYOUT METHOD for machinists, tool, die and model makers, sheet metal workers, and metal pattern makers, is clarified in a new folder released by Tamms Silica Co., Chicago. Tamms' Blue Layout Dope is far superior to the old copper sulphate method in that it gives a marked contrast on all metals—thereby relieving eye strain and promoting accuracy. It dries quickly and is oil resistant. The lines will not blur or chip when used under wet machining. These, and many other advantages are detailed in this folder. Tamms' layout dope can also be obtained in black, orange, red and green. It is available in cans from 8 oz. to 5 gal. at TAMMS SILICA CO., Dept. 43, 228 N. Lasalle St., Chicago 1, Ill. **Inform-A-Gram Key No. B79.**

A HANDY POCKET-SIZE TOOL CATALOG has been published recently by Morse Twist Drill & Machine Co., New Bedford, Mass. This 310-page catalog is printed on heavy stock for long wear. It has many references and a quick-reference thumb guide for easy selection of the desired section. Sections consist of drills; reamers; counterbores; countersinks; cutters; end mills; taps and dies; tungsten carbide; miscellaneous products; and a mechanical data section giving charts and useful machining information. Each section includes pictures of the tools, sizes, and uses. Send for your copy to MORSE TWIST DRILL & MACHINE CO., Dept. 80, New Bedford, Mass. **Inform-A-Gram Key No. B81.**

THREE "CARMET" BOOKLETS are now available which graphically portray Allegheny Ludlum's line of carbide products. Carmet "Methods Manual" covers the selection, fabrication and application of tools and blanks, with complete drawings to illustrate all operations and tool types. There is much useful and interesting information in this booklet on grinding, chip breakers, hints on setup, coolants, brazing, and adaptations. "Carmet Specialties" is primarily for the tool and die makers—it describes in detail the possibilities of preforming dies, gages, etc., of Carmet. "Gage Blocks and Bushings" gives complete technical data and specifications for ordering Carmet products. These are attractively printed in two colors and contain photographs, drawings, specifications, and application data. They are ready-punched for notebook filing. Also in the same notebook size are Allegheny-Ludlum's "Blue Sheets" covering all of the die steels, their uses, analyses, forgings, hardenings, etc. Send for your copies to ALLEGHENY LUDLUM STEEL CORP., Dept. 678, Oliver Bldg., Pittsburgh 22, Pa. **Inform-A-Gram Key No. B82**

TITEFLEX ALL-METAL FLEXIBLE HOSE, and its design and construction are clearly and explicitly presented in a 24-page catalog newly published by Titeflex, Inc. Besides the brass tubing, Titeflex new bronze tubing for nominal steam pressure applications, monel and stainless steel tubing for higher temperatures and corrosion resistance, and inconel tubing for extremely high temperatures are

thoroughly discussed. The catalog includes specifications for standard fittings and illustrations of typical assemblies with these fittings. Also described are Titeflex bendable pipe, high frequency conductors, and vibration eliminators. Send for this comprehensive catalog to TITEFLEX, INC., Dept. 31, 654 Freylinghuysen Ave., Newark 5, N. J. **Inform-A-Gram Key No. B91.**

MATERIALS HANDLING EQUIPMENT for every use in the shop and plant are dramatically portrayed in a bulletin put out by the manufacturer, Economy Engineering Co., Chicago. Electric and hand power lifters are described as to construction details, specifications and capabilities. The bulletin is profusely illustrated with actual job applications of Economy's various lifters—for handling skids and pallets, dies, paper, large, heavy rolls, heavy drums and barrels, and overhead maintenance—to mention a few. Almost any lifting, handling and loading problem can be readily solved by referring to this bulletin (940-B) available by writing to ECONOMY ENGINEERING CO., Dept. 277, 2659 W. Van Buren St., Chicago 12, Ill., or by circling **Inform-A-Gram Key No. B84.**

New NESTING TYPE
TOTE PANS

20" Long x 12" Wide x 6¼" Deep 16 Ga., drag holes, handles both ends.

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It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind — not just rub. Every mechanic knows this, but inexperienced buyers may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work—longer wheel life.

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Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

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☐ Reduce tool room labor cost. Make chuck jaws for holding irregular parts in a fraction of the time by the Cerromatrix method.

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This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
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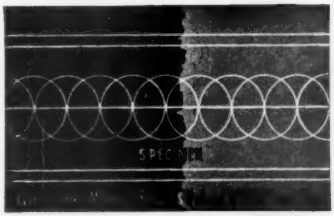

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NEW SAFETY DIRECTORY FOR 1948, covering the entire field of safety, fire protection and control, hygiene, first-aid and sanitation, is now available to industry. The directory shows what safety products to use for specific hazards; how to use them and where to buy them. Safety directors, safety engineers, production men, insurance agents, medical personnel and other executives will find this

directory invaluable. Subject-grouping and a cross-index make it easy to locate a product when the exact name is not known. Profusely illustrated, this 494-page volume sells at $5.00 and may be obtained from Alfred M. Best Co., Dept. 45, 75 Fulton St., New York 7, N. Y.

HIGH-SPEED STEEL CATALOG is a new 80-page booklet which condenses descriptions, heat treatment, and application data on all the most widely used Latrobe products. A most extensive shop summary on Latrobe steels, the information covers numerous weight, conversion and related tables, each marked by a tab for quick selection of the classifications which include high-speed, non-deforming, oil hardening, hot work, shock and chisel, die casting, and water hardening. Bound in tough imitation leather, the booklet is obtainable from Latrobe Electric Steel Co., Dept. 67, Latrobe, Pa., or circle **Inform-A-Gram Key No. C17.**

MACHINE SHOP OWNERS OR MANAGERS will derive great benefit from the newly revised second edition of "Running a Machine Shop" by Fred H. Colvin and Frank A. Stanley. It is a complete and practical guide to effective practices for both large and small shops. It explains how to set up and equip a shop, how to plan work, how to inspect and control it, where to economize, how to increase production, how to keep records, and how to manage men. In addition there is practical information gathered from wartime experience on job evaluating, rating and rotation. The book sells for $4.25 and is published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y.

"FABRICATING FIBESTOS AND VUEPAK" is a most interesting and informative bulletin on the various processing techniques employed for these Monsanto cellulose acetate plastic materials. Step by step methods, used for the production of such items as blown toys, plastic covered heels, watch and radio crystals, buttons, novelties and brushes, are clearly pictured and described. A dissertation on the general methods of shipping, storing, cutting, sewing, embossing, drilling and forming of these cellulose acetate materials completes this highly instructive book. Send for Bulletin No. 50 to MONSANTO CHEMICAL CO., PLASTICS DIV., Dept. 984, Springfield, Mass. **Inform-A-Gram Key No. C20.**

A CHART GIVING PROPERTIES OF 17 POPULAR PLASTICS, easily readable for quick reference, is now available at Koppers Company. The chart measures 17" by 22"—a convenient and attractive size for framing—and is arranged to assure quick information on the relative degree of a particular property as possessed by the different rigid plastics. A total of 30 properties are arranged under the general headings of mechanical, electrical, optical, and thermal, as well as inflammability and stability. KOPPERS CO., INC., Dept. 48, Chemical Div., Koppers Bldg., Pittsburgh 19, Pa. **Inform-A Gram Key No. C21.**

Solid Carbide Boring = Precision Work

Reduced costs, improved accuracy, increased tool life, and controlled surface finish are being realized by manufacturers utilizing boring bars made from solid Carboloy cemented carbide, a product of Carboloy Co., Inc. The high rigidity possessed by these carbide bars, 2.8 times greater than steel, makes possible precision boring holes with a relative length up to eight times hole diameter. The greater stiffness of carbide bars and the absorbing and dampening of vibration by the carbide itself results in longer tool life and better finish control.

These Carboloy cemented carbides' characteristics have made possible the designing of a new automatic machine for boring wrist pin holes in cast aluminum pistons.

Total length of hole through both bosses in these pistons is 5.8 times hole diameter. Using a Carboloy boring bar assembly, Figure 1, this new machine permits, from one side only, "through" boring. As a result, spindle and tool maintenance have been reduced 50 per-

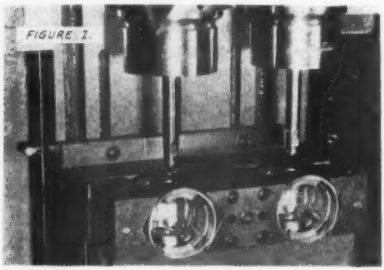
FIGURE 1.

cent over past methods.

The two-spindle machine produces 288 pistons an hour; approximately 2,300 per eight-hour shift. Cutting speed is 980 ft/min. Floor to floor time is 25 seconds for every two pistons. Ability of the carbide bar and tool to hold size and surface finish over long runs has eliminated time lost in tool change shut-downs.

Another application of the carbide boring bar is boring cast iron automotive valve guides having a ratio of length of bore to bore diameter of 7.3:1. These holes, bored in one "out" pass with the solid carbide boring bar, Figure 2, are straight, round, and concentric with the OD to a tolerance of .0002. The job is run at 178 sfpm with a feed of .002" per revolution. This operation produces 2,400 guides per eight-hour shift. Tool life is between 12,000 and 18,000 bored pieces per grind.

Another manufacturer experienced difficulty holding a .0002" tolerance when boring $\frac{3}{16}$" cylinders in the bronze body of hydraulic pumps. The holes had a

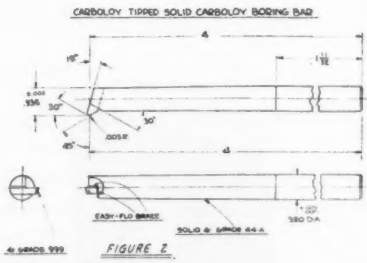

FIGURE 2.

length-to-diameter ratio of 6:1. A solid Carboloy boring bar, installed in one spindle (finish boring) of the two-spindle machine, Figure 3, solved the problem. The parts as inspected at the machine were consistently being held within a tolerance of .00005".

Complete information is available from Carboloy Co., Inc., Dept. 82, 11109 E. 8 Mile Rd., Detroit 32, Mich., or circle **Inform-A-Gram Key No. D16.**

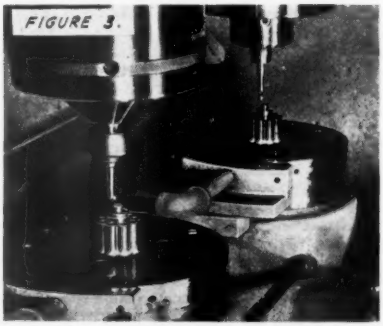
FIGURE 3.

Hammond of Kalamazoo

MODEL
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FLEXIBLE
ABRASIVE BELT
GRINDER

"The All Purpose Machine"

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- FLEXIBLE
- PLATEN
- CONTOUR

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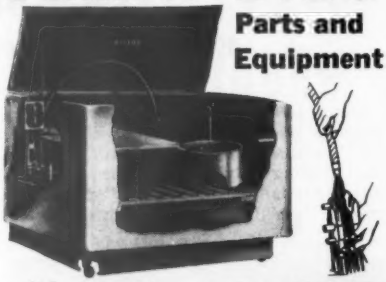

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PRECISION GRINDING
FAST SERVICE... EXPERT WORKMANSHIP... LOW COST

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- CRUSH FORM
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- TWIN DISC
- SURFACE
- THREAD

Acme is equipped to handle all types of precision grinding. Expert craftsmen, using newest methods and modern equipment, will do the job for you faster, better, more economically. Acme also offers a flat lapping service that can finish surfaces to within millionths. Write for details.

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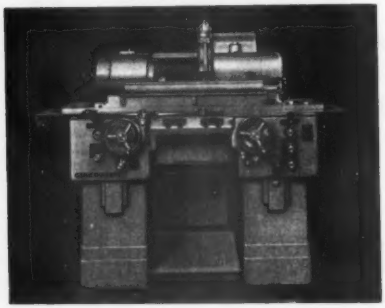
THE SERVICE SHOP TO INDUSTRY FOR MORE THAN 25 YEARS

Small Diameters Easily And Accurately Ground

Designed for precision center-type grinding operations on small diameters, the Cincinnati Filmatic 4″ Plain Hydraulic Grinding Machine can be provided with "hands" or "automatic" type hydraulic infeed mechanisms which give



the machine high productive capacity for traverse or infeed operation.

Many new and exclusive features incorporated in these machines simplify and speed production, and help the operator attain extremely close limits of accuracy and finish. Hand table traverse has a two-speed arrangement, to permit rapid positioning for set-up purposes, or slow hand adjustment for shoulder grinding. Hydraulically actuated power table traverse rates are infinitely variable. An independent truing rate can be selected, and grinding wheel trued without disturbing traverse rate setting.

Dog-operated table reverse is accurate within .001″. Table reciprocation is accomplished with a short stroke to simulate grinding wheel spindle reciprocation, or, in conjunction with automatic pick-feed mechanism, to simulate infeed grinding on short work.

Headstock drive may be specified for ac or dc. If dc motor drive is used, headstock speeds are infinitely variable under control of a 3-step V-belt drive and rheostat. Standard equipment includes a dead spindle headstock, but a live spindle unit is also available.

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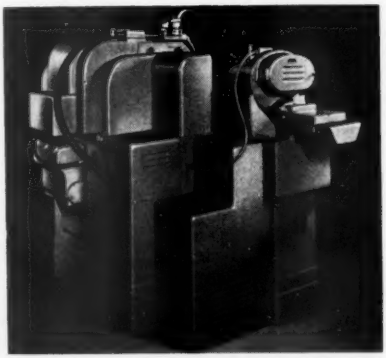

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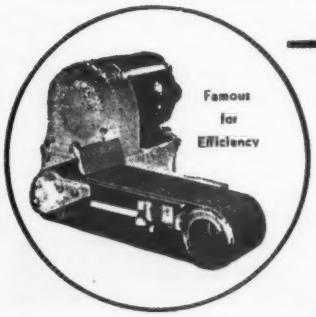

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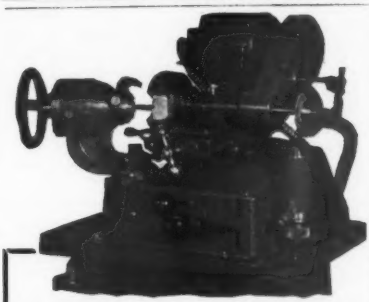

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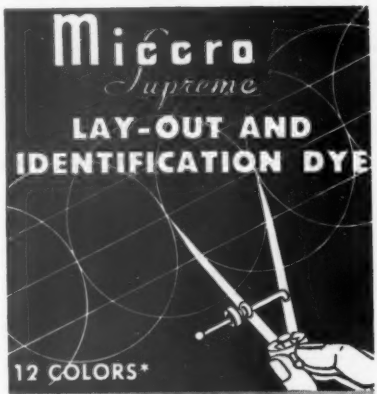

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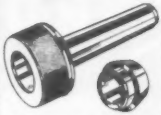

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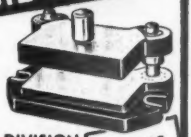

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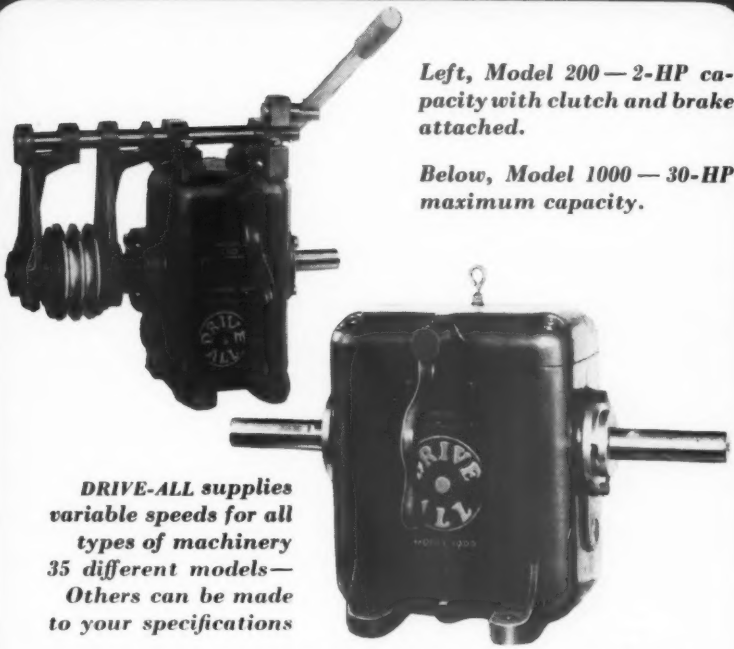

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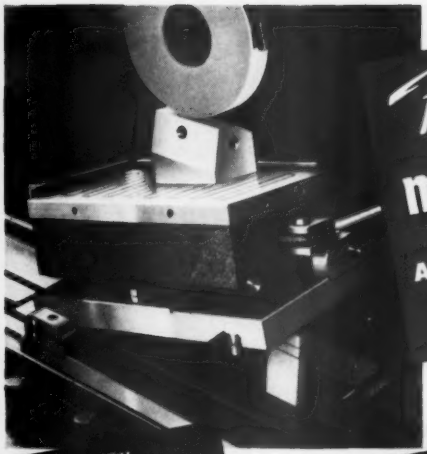

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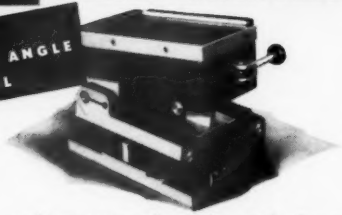

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